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ate-of-the-arts program

**Northeastern University
1974-1975**

**Boston
Burlington
Weston**



386533

The proliferation of new knowledge has made it increasingly difficult for professionals to keep up with advances in today's fast-moving technology. The State-of-the-Arts Program is designed to help practitioners stay abreast of the latest developments in their field by supplementing their learning on the job with more formalized course work.

The courses present relevant information in a ready-to-use form. They are designed for adults, and take into consideration the individual differences amongst the participants. Class size is intentionally limited to permit flexibility and enable ample discussion of the course content.

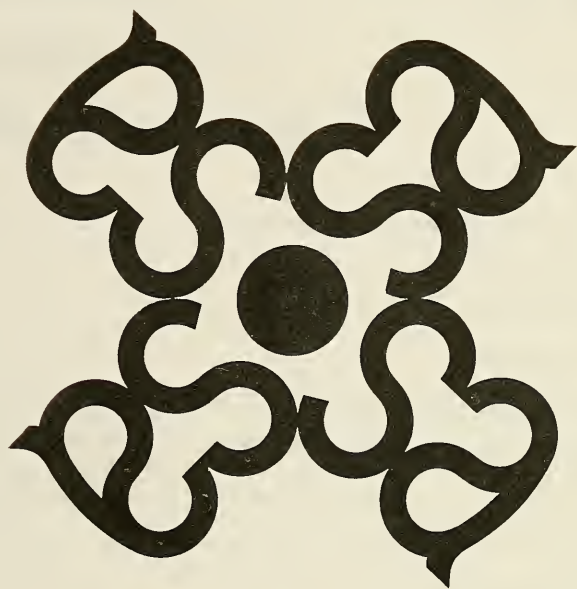
For the first time in the eleven year history of the program, this catalog describes the full year's course offerings. Please keep it as a reference. Bulletins for Spring Semester courses will list scheduling information only.

In addition to our continually evolving engineering programs, you will discover a variety of new courses in biomedical sciences, occupational health and safety, and general management of technological organizations. These courses will attract many new participants from diverse fields of professional practice. I would like to welcome them and hope that they will find experiences in our program meaningful to their continuing professional development.

Donald D. French
Director, State-of-the-Arts Program

SPECIAL EVENT

Monday, September 16, 1974 from 5:30 p.m. to 7:30 p.m., participants have a unique opportunity to discuss courses of interest to them with our faculty. "Meet the Instructor Night" is held at Weston High School to supplement catalog information and enable prospective students to ascertain the appropriateness of our engineering courses for their needs. Refreshments will be served. We look forward to seeing you.



state-of-the-arts

. . . for practicing professionals

Northeastern University 1974-1975
Center for Continuing Education

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Continuing Education and The Professional

to achieve and maintain preeminence, professionals must be alert to the latest accomplishments in their fields, the ideas or theories accepted and rejected, the speculative developments in progress, and the new knowledge emanating from research that affects their work.

Resourceful practitioners help themselves stay abreast of technological advances through personal contribution to those advances, diligence in the review of scientific and technical literature, and by attendance at or participation in their professional society seminars and symposia. However, it is becoming increasingly difficult for professional people to acquire perspective and depth in their own fields, or in the numerous peripheral areas, without formal study of a continuing sort at the very frontiers of knowledge or areas involving complex techniques. Recognition of this fact is now basic to continued professional growth and noteworthy contribution.

Northeastern University, through the Center for Continuing Education, provides a neutral ground where student talent can be assembled from diverse organizations with common interests in given areas of technological advance. It seeks out leading contributors to those advances who are also able to stimulate study and provide insights essential to understanding. It develops an academic climate conducive to discussion, examination, exploration, conception, and learning. It maintains small class size (classes average 15 students) to provide individual participation and development. It encourages scholarship leading to the significant and measurable acquisition of new knowledge or proficiency in new techniques. It combines the resources of the industrial and academic communities in appraising trends in technology for the planning and offering of programs aimed specifically at advancing the competence and competitive position of New England industry.

General Information

Registration: Fall

The registration application should be sent to the Center for Continuing Education before Monday, September 23, 1974. Textbooks and materials are ordered on the basis of registration received by this date. Students registering after this date may experience some delay in receiving course materials.

Most classes must have a minimum of eight registrants. Since we must start cancel classes with insufficient enrollment by Monday, September 30, 1974, we should have some notification of intention to enroll prior to this date. This can be accomplished by mail or by phone. Notifying the Center in sufficient time insures a greater number of running courses.

Tuition

Tuition for each course is specified in the course description and normally includes all necessary texts and instructional material. Tuition bills are issued approximately two weeks after the start of the course and are payable on receipt. Bills are sent to the student unless we are authorized on company letterhead to bill the work organization. Tuition for five and six session minicourses must be paid in full prior to the start of the program.

Certificate of Course Completion

Students must attend at least 75% of the sessions in order to receive certificate of completion.

Academic Calendar

Fall Classes Begin	Monday, October 7, 1974
Columbus Day—No Classes	Monday, October 14, 1974
Veteran's Day—No Classes	Monday, October 28, 1974
Thanksgiving Day—No Classes	Thursday, November 28, 1974
Christmas Vacation—No Classes	Tuesday, December 24, 1974 —Wednesday, January 1, 1975
Washington's Birthday—No Classes	Monday, February 17, 1975
Spring Classes Begin	Tuesday, February 18, 1975
Patriots Day—No Classes	Monday, April 21, 1975
Memorial Day—No Classes	Monday, May 26, 1975

Registration: Spring

Advanced registrations for spring courses will be accepted any time during the fall semester. Spring registrations need not be accompanied by payment. The advanced registration procedure enables us to forecast expected enrollments and properly plan for the purchase and production of instructional material. It also insures your entry into potentially oversubscribed courses or programs with limited enrollments. Your cooperation in advising us of your interests in our spring programs will be greatly appreciated and mutually beneficial.

Continuing Education Units

Continuing Education Units (CEU's) are awarded for successful completion of State-of-the-Art courses. CEU's are nationally recognized units of measure that indicate participation in a qualified program of continuing education. The CEU is defined as ten contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction, and qualified instruction. CEU's are equivalent to Professional credits granted by the program over the past ten years.

The Center for Continuing Education maintains permanent records of your participation in our programs, and will provide you with an official transcript upon request. A one dollar service charge must accompany transcript requests.

Requirements for the "Certificate of Professional Achievement" are currently under revision. The new requirements will be made available to participants the fall.

Inclement Weather

In the case of inclement weather, Weston-based State-of-the-Art classes follow the same schedule that the University provides for the Burlington Campus. Class cancellations are announced regularly on the following radio stations: WBZ, WEEI, and WHDH.

New Courses and Instructors

The Center for Continuing Education is constantly seeking new courses and instructors to meet community needs and remain at the state-of-the-art. We usually seek key industrial contributors, consultants, or university faculty members with industrial experience. If you are interested in proposing a course or seminar, submit a rough outline of the program, including a resumé of all proposed lecturers.

The Center is eager to learn of industry's educational needs and is most receptive to requests for establishing new courses, seminars, or specific inplant programs.

For Further Information Contact

Professor Donald D. French
Northeastern University
Center for Continuing Education
360 Huntington Avenue
Boston, Massachusetts 02115
(617) 437-2607, -2610

Interactive Programs in Engineering and the Applied Physical Sciences

The Center for Continuing Education develops interactive continuing education programs to meet the special needs of certain industrial and business organizations, research institutions, and government agencies. These programs assist engineers and physical scientists in assessing the current state-of-the-art in their fields, establishing realistic goals for achievement, and planning research and development activities necessary to achieve those goals consistent with their present position and competence.

Participants for the programs are carefully selected during joint meetings between members of both the client organization and the faculty of The Center for Continuing Education. Most of the new knowledge taught at interactive sessions comes from the participants themselves, but experts are brought in to provide theoretical and applied knowledge as required at class sessions and to remain as consultants during problem solving interaction amongst the participants. Classes are deliberately kept small. The emphasis is on problem solving, creativity, evaluation, design synthesis, theoretical analysis, and practical innovation. In most instances, such interactive programs pay for themselves through the increased competence of the participants and the actual solution of company problems while the course is in progress.

Persons or organizations interested in exploring interactive continuing education as described above should contact Professor Israel Katz, Director of Advanced Engineering Programs, Room 310 Churchill Hall, Northeastern University, Boston, Massachusetts 02115, or by calling (617) 437-2612.

Professional Engineers License Exam Preparation

1030 Professional Engineers License Exam Preparation EIT

This course forms the cornerstone of the preparation for the profession engineering examinations. A thorough review of mathematics is provided in addition to the important concepts common to all engineering areas. Numerous sample problems are reviewed in class. Approximately half of the course is devoted to structural engineering. The program is designed to help the participant to prepare for the April, 1975 Engineer-in-Training examination.

Course Content Review of mathematics, statics, dynamics, mechanics of incompressible fluids. Thermodynamics, heat transfer, electricity and electronics, chemistry, physics. Engineering economics. Beam design: stress, shear and bending moment, deflections. Statically indeterminate beam and columns, reinforced timber and concrete construction.

This course is tentatively scheduled for presentation at the Boston Campus from January to April 1975. When available, complete information will be mailed to those who indicate interest by returning the reply card from the back of the catalog.

1031-1032 Professional Engineers License Examination Preparation: Mechanical Engineering I and II

This two-part course for graduate engineers familiarizes participants with the material in the mechanical engineering portion of the April, 1975 Professional Engineers License Examination. It provides a general review of the undergraduate curriculum in mechanical engineering and an overview of design practice. Numerous sample problems are reviewed in class to illustrate the principles involved. Participants should have a working knowledge of college algebra and calculus, elementary differential equations, analytic geometry, and elementary statics. Specialists present selected topics. Either course can be taken independently.

Course Content: Part I Strength of machine elements, stress analysis, deflection analysis, worm and bevel gears, spur and helical gears, pumps, variable speed drives, gear rating and optimization, fluid mechanics, fuels and combustion, heat transfer, heat exchangers, heating, ventilation, and air conditioning.

Course Content: Part II Steam generators, steam turbines and engines, gas turbines, diesel engines, heat balances, clutches, brakes, couplings, shafts and flexible elements, lubrication and journal bearings, materials, processes, antifriction bearings, dynamic systems, interest, depreciation, economic fundamentals, alternate proposals, replacements, cost analysis, contract bids.

Faculty: Dr. Lee S. Akin, Consulting Engineer, Course Coordinator
Mr. Thomas E. Foy, Manager, Turbine Analysis
Mr. James J. Mross, Engineer
General Electric Company

Dr. Thomas Tsai, Engineer
New England Electric System

Part I: Monday evenings, 5:10 to 7:10, 12 sessions beginning October 7, 1974.
Tuition: \$170, including instructional material. **Location:** Boston Campus. 2.4 Continuing Education Units.

Part II: Monday evenings, 5:10 to 7:10, 12 sessions beginning January 20, 1975. **Tuition:** \$170, including instructional materials. **Location:** Boston Campus. 2.4 Continuing Education Units.

Parts I and II: Tuition: \$300

033: Professional Engineers License Exam Preparation: Electrical Engineering

For graduate engineers, this course familiarizes participants with the material of the electrical engineering portion of the Professional Engineers License Examination. A general review of the undergraduate curriculum in electrical engineering is also provided. Numerous sample problems are solved in class to illustrate underlying principles and techniques. Participants should have a working knowledge of college algebra and calculus, elementary differential equations, and analytical geometry. The program concludes before the April, 1975 P. E. Exam. Specialists present selected topics.

Course Content Linear circuit analysis; single and polyphase networks. Transient behavior and transform techniques. Transformers; regulation and efficiency. Electrical machinery. Communications systems; theory and

hardware. Power transmission and distribution; protection devices, switching, and economics. Electromechanical devices and analogous circuits. Illumination. National Electrical Code. Interest. Depreciation. Economic fundamentals. Alternate proposals. Replacements. Cost analysis. Contract bids.

Course Coordinator: Professor Marcello J. Carrabes
Department of Electrical Engineering
Northeastern University

Tentatively scheduled for Wednesday evenings, 5:10 to 7:10, 14 sessions, beginning January 8, 1975. Tuition: \$175, including instructional materials. Location: Boston Campus. Two Continuing Education Units.

Note Also see the following courses listed in the appropriate section:

2180	Illumination Engineering
2856	Noise Measurement and Control
7510	Project Administration
7513	Project Financial Management
7570	Finance for Engineers
7615	Power Generating Plant Safety and Reliability
9560	Industrial Ventilation

Systems Theory and Engineering

1201 Modern Communications Systems Seminar

A series of six seminars is offered on recent advances in communication systems and techniques. Each session is conducted by a key contributor to the field under discussion. Topics tentatively include: multi-user systems, coded systems, HF and troposcatter communications, spaceborne communication systems, VLF communications, and optical communications. The program content and faculty arrangements will be finalized on October 1, 1974. Complete information will be mailed to those who indicate interest by returning the reply card from the back of the catalog.

Coordinator: Dr. Jack J. Stiffler
Consulting Scientist
Raytheon Company

Thursday evenings, 5:00 to 7:00, 6 sessions, beginning March 20, 1975. Tuition: \$65, including instructional material. Location: Henderson House, Weston, Massachusetts. 1.2 Continuing Education Units. Full payment must accompany registration.

1203 Data Communications Systems

Data communications system growth of the 70's requires the application of on-line conversational data base systems. Flexible communication facilities are essential for these new applications. This course, for communications and data processing managers and systems and application programmers, covers facilities available to users for meeting performance and economic objectives. Techniques used to transmit data via common carrier and private communications facilities are discussed. User options for selecting line speeds, controllers, terminals, and communication software are described. The course enables participants to understand the communication facilities and how to match terminals, data processing systems, and software needed for the on-line functions. Cost/performance is emphasized throughout. Familiarity with remote job entry, time sharing systems, or similar communication systems used for transmitting data is desirable.

Course Content Introduction to data communications. Communications equipment. Hardware and software communications and computer system interfaces. Modulation schemes; transmission speeds; line control procedures; terminal buffering; front end control techniques. Front end processors. Network control software. Effect of transmission block size on performance. Use of line concentrators for improved line loading. Use of multiplexors for improved channel utilization. Remote job entry systems. Types of applications and their dependence on communication facilities. Application of dedicated communication systems to: law enforcement; airline, motel, and recreation reservation systems; state and local government; and credit and banking systems. Terminal selection considerations for system optimization. Trends in data communications.

Faculty: To be announced

Monday evenings, 5:00 to 7:00, 14 sessions, beginning February 24, 1975. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1204 Theory and Practice of Data Communication

General principles of data communication are covered including modern techniques which allow improved performance over real communication channels. The emphasis is theoretical but is tempered by strong consideration of actual engineering practice. The course provides the participant with a working knowledge of the principles and current techniques used in data communications. A familiarity with signals and noise analysis is desirable.

Course Content Basic concepts of modulation and coding, channel characterization problems, bounds for digital communication, baseband pulse transmission, optimization and equalization of baseband systems, linear and nonlinear modulation, basic concepts of error correcting codes, block codes, convolution codes.

Faculty: Dr. Jack J. Stiffler
Consulting Scientist
Raytheon Company

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1207 Theory of Synchronous Communications

Fundamentals of modern communication theory are covered with emphasis on the often neglected problem of acquiring and maintaining synchronization. The mathematical discussion is qualitative; important results are

stated, and the emphasis is placed on concepts and significance rather than mathematical details and derivations. Space communication systems are discussed.

Course Content Elements of information theory. Decision theory, detection and estimation; search strategies, sequential and fixed sample size tests, optimum sequential search, multiple hypotheses, parameter estimation. Time-discrete communication systems; the sampling theorem, evaluation of pulse modulation systems, optimum demodulation, PAM, PSK, phase coherent and phase incoherent detection, orthogonal symbols, DPSK. Wiener theory; optimum filters, matched filters, phase estimation, phase locked loops. Bit and symbol synchronization; clock signals, signal design, maximum likelihood synchronization. Carrier tracking; PAM, PSK, Costas loop, squaring loop. Power allocation.

Faculty: Dr. Jack J. Stiffler
Consulting Scientist
Raytheon Company

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1208 Synchronization and Coding

This course deals with coding as applied to error detection and correction, and to synchronization error correction. After a brief survey of coding theory, the course concentrates on the following topics: decodable and synchronizable codes; decodable and synchronizable block codes; error correction; synchronization error detection and correction. Emphasis is not placed on the abstract theory of code construction, but on the advantages to be realized through their use and the implemental cost of exploiting these advantages. Participants are brought up-to-date with the latest developments in data representation, error control coding, and synchronization. Some familiarity with communications theory and practice is advised.

Course Content Coding philosophy. Source coding, the Kraft inequality and exhaustive dictionaries, Huffman codes, unique decodability and Sardinas-Patterson algorithm. Decodable and synchronizable codes, self-synchronizing code dictionaries, maximal synchronizable dictionaries. Comma-free codes, prefix codes, comma codes. Error-correcting and detecting codes, linear codes, cyclic codes, punctured cyclic, shortened cyclic, and Hamming codes. Kronecker product, Kronecker sum, and concatenated codes, convolutional codes. Barker and pseudo-noise sequences. Synchronization error-detecting and correcting codes, comma-free error-correcting codes, the index of comma freedom.

Faculty: Dr. Jack J. Stiffler
Consulting Scientist
Raytheon Company

Monday evenings, 5:00 to 7:00, 14 sessions, beginning February 24, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1240 Optical Fiber Communications Systems

Recent advances in low-loss optical fibers and integrated optics has greatly expanded the use of optical systems in a broad variety of communications applications. This course, for communication systems designers and optical systems applications engineers, discusses the characteristics as well as the underlying principles of optical communication systems and components. Light sources, fibers, and photo-detectors as system elements are discussed. Several optical fiber communication system designs are reviewed. Present and future systems are compared with those currently in use. Participants should be familiar with basic communication theory and electronics.

Course Content Basic optical fiber communication system components. Device modelling and principles of operation. Physical properties of optical fiber waveguides. Wave propagation in optical fibers. Physical properties of photon detectors; noise models, SNR, NEP. Performance of detector, amplifier circuits. Properties of selected light sources for OCS. Drive amplifiers and performance. Modulation techniques and information capacity. Review of integrated optical components. Coupling to optical fibers. System design requirements and component specification review. Case studies: short range broad band hook-ups, bus system designs, multi-channel video communication systems, video transmission and distribution systems, and telephone interoffice trunk systems. Future developments and cost trends.

Faculty: Dr. John E. Fulenwider
Senior Scientist
GTE-Laboratories

Dr. Mark L. Dakss
Member, Technical Staff
GTE-Laboratories

Tuesday evenings, 5:00 to 7:00, 8 sessions, beginning October 8, 1974.
Tuition: \$110, including instructional material. Location: Weston High School, Weston, Massachusetts. 1.6 Continuing Education Units.

1524 Radar Systems: Design and Applications

Underlying principles of radar systems are described covering components, theory, and applications. Analytic techniques and design concepts useful in the synthesis and analysis of radar systems are presented. Recent advances in phased array radars, air traffic control radars, and microwave landing systems are discussed by leading experts. Participants should be familiar with electromagnetic theory, basic electronics, and communication theory.

Course Content Overview of radar systems, generic block diagram of radar functions. Analytic description of antenna parameters; radar cross-section; noise temperature, available power gain; power, energy, and signal to noise ratio; radar range equations. Principles of pulse doppler radars, matched filter theory, pulse compression, radar uncertainty principles, resolution, ambiguity and signal processing, detection calculations, and radar measurements. Applications: phased array, weather radar, air traffic control, microwave landing systems.

Faculty: Dr. Herbert L. Groginsky
 Technical Director
 Advanced Development Laboratory
 Raytheon Company
 Dr. Maurice Meyers, President
 Meyers Associates

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

1528 Radar Processing and Automatic Detection

The design techniques and relationship between a radar signal processor and its specific application are covered. A discussion of theoretical constraints and practical limitations of various processing techniques are integrated with a case study of a processor design for a search radar. Participants should have familiarity with basic probability and transform theory.

Course Content Introduction to radar processor design and principles. Target characteristics. Radar detection theory. Matched filters. Limits on performance. Practical detection procedures. Radar environment: propagation, clutter characteristics, interference problems. Constant false alarm rate processing. Resolution theory. Pulse compression techniques. MTI and pulse doppler. Sidelobe suppression and ECCM techniques. Theory of measurement. Radar accuracy. Case study: A Search Radar Processor and Automatic Detector.

Faculty: Mr. V. Gregers Hansen
Principal Engineer
Mr. Harold R. Ward
Consulting Engineer
Raytheon Company

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

1704 Random Processes

This tape-lecture series presented in cooperation with M.I.T.'s Center for Advanced Engineering Study provides a comprehensive coverage of random processes. A working knowledge of probability theory is assumed. Guest lecturers will discuss selected application areas in addition to the video presentations developed by Dr. Harry L. Van Trees, Professor of Electrical Engineering at M.I.T.

Course Content Introduction to random processes: basic concepts and definitions, fixed-form random processes, binary transmission wave, random telegraph wave, second-moment characterizations, the role of the covariance function in estimation. Linear systems: system descriptions, linear system descriptions, convolution integral, system classification, complex exponential inputs—frequency domain analysis, periodic inputs and Fourier series, Fourier transforms, system functions, Fourier transform properties, Laplace transforms, sampling theorem. Second moment theory: linear systems with random inputs, time averages, frequency domain analysis of stationary random processes, white noise, two applications of white noise, matched filters, optimum fixed-form linear filters, optimum linear filters. Poisson processes: introduction, Poisson counting process, arrival times, filtered Poisson processes, limiting behavior of filtered Poisson processes. Markov processes: introduction, Markov process equations, finite-state processes, pure birth processes, solutions techniques using probability generating functions, equilibrium distributions. Gaussian processes: introduction, Gaussian random vectors, Gaussian random processes, Gaussian processes and linear systems, Gaussian processes and non-linear systems, linear optimality and general optimality, summary of Gaussian processes. Measurement of process characteristics: introduction to the measurement problem, measurement of correlation functions and mean-square values, spectral estimation.

Tuesday evenings, 5:00 to 7:00, 28 sessions, beginning October 10, 1974. Tuition: \$350, including texts, study guides, and notes. Location: Weston High School, Weston, Massachusetts. Make-up sessions are available at Weston High School. 5.6 Continuing Education Units.

1718 Modern Chemical Process Design

This course covers the latest developments in the design and analysis of chemical processing systems. It is designed for process engineers familiar with chemical engineering practice. The course enables the participant to apply the most up-to-date techniques of process design within a unified approach to specific applications. Case studies will be utilized to illustrate each technique and actual problems will be solicited from the class members. Class size is limited to 15.

Course Content Development of design strategy. Process flowsheet development. Creation and assessment of alternatives: synthesis of feasible alternatives, the structure of chemical processing systems, economic design criteria, and cost estimation. Optimization: direct search, linear programming, dynamic programming, and macrosystem optimization strategies. Engineering in the presence of uncertainty: accommodating changes in the market, treating uncertainty in design data. Failure tolerance: process failure, emergency operations, safety analysis. Scheduling process operations.

Faculty: Dr. Gary J. Powers
Assistant Professor of Chemical Engineering
Massachusetts Institute of Technology

Thursday evenings, 5:00 to 7:00, 14 sessions, beginning February 20, 1975. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1726 Computer Simulation of Systems

Techniques and considerations involved in performing a thorough systems simulation with computer utilization are presented through case studies. These cases cover a wide range of interest—scientific, commercial, medical, transportation and aerospace systems, etc.

Course Content Philosophy and theory of simulation. Modeling techniques: mathematical definition of the system and its environment. Techniques for organizing the simulation: selection of computer configurations, choice of languages, characterizing the workload, and specifying and analyzing the system performance. Applicability, capabilities, and limitations of digital, analog, hybrid, real-time, and time-shared simulation. Evaluation and

practicality of computer simulation languages, software, hardware, and related trade-offs. Applications—discussed in the classroom and demonstrated in the laboratory. Applications of general class interest are solicited from participants.

Faculty: Dr. Albert M. Colella
Systems Engineer
Department of Transportation
Mr. Michael J. O'Sullivan
Senior Staff Analyst
Honeywell Information Systems, Inc.

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning October 10, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1735 Industrial Process Control

Principles of modern industrial process control and the latest techniques of implementing these control and optimization strategies are covered. The course is designed for practicing engineers engaged in the field of process control and others who wish to gain a comprehensive overview of what is obtainable with today's technology. Participants have the opportunity to discuss work-related process control problems in class.

Course Content Steady state and dynamic process behavior. Simulation and analysis of control loops. Controllers and controller tuning. Cascade and setpoint control. Feedforward and model-based control. Descriptions of analog control hardware, computer system hardware and software used in process control applications. Control system reliability and hierarchical control concepts.

Faculty: Dr. John W. Chang
Senior Systems Engineer
Mr. F. G. Shinskey,
Control Systems Consultant
Foxboro Company
Dr. Gary J. Powers
Assistant Professor of Chemical Engineering
Massachusetts Institute of Technology

Monday evenings, 7:15 to 9:15, 14 sessions, beginning February 24, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1737 Industrial Application of Minicomputers

The underlying principles of minicomputer architecture, software, and applications are introduced. These elements are developed in sufficient detail to enable the participant to select the best minicomputer for specific applications. System design and interfacing problems are discussed. Vendor data and manuals are studied to facilitate minicomputer-based system selection, implementation, and use.

Course Content Overview of minicomputer-based systems. Review of computer fundamentals including: hardware, software, and computer operation. Instructions, programming, and systems software. Minicomputer architecture. Evaluation and selection criteria. Peripherals and special devices. Real-time and batch applications.

Faculty: Mr. Dominick J. Carlino
Senior Staff Member
Western Electric Company

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

1738 Digital Computer Control

This course surveys topics from several engineering disciplines and develops the techniques required for computer control applications. It is intended for system designers and analysts involved in the computerization of engineering processes. A systems approach to the computerization problem is taken and the applicable controls methodology is introduced. Acquaintance with or a working knowledge of any topics listed below is desirable, but not an absolute prerequisite.

Course Content Fundamentals of digital computers, functional description of real-time data processing and control, numerical techniques, difference equations, z-transforms, sampling and conversion, digital filtering, fast Fourier transforms, sampled-data control systems, modeling and simulation, optimization and optimal control, identification and adaptive control, direct digital control, discussion of several (actual) digital control systems.

Faculty: Mr. Dominick J. Carlino
Senior Staff Member
Western Electric Company

Monday evenings, 7:15 to 9:15, 14 sessions, beginning February 24, 1975. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1740 Optimization Techniques

A comprehensive survey of practical optimization techniques applicable to a broad variety of multi-variable system and design problems. Avoiding undue mathematical rigor, the theory is demonstrated by numerous sample problems. Computational aspects are stressed. Participants should have familiarity with advanced calculus and a higher order programming language such as FORTRAN, BASIC, or ALGOL.

Course Content Theory of maxima and minima. Variational calculus. Linear programming. Nonlinear programming. Dynamic programming. Maximum principle.

Faculty: Mr. Dominick J. Carlino
Senior Staff Member
Western Electric Company

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning October 10, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

1750 Transportation Systems Engineering

Problems confronting the nation's current and projected air and ground transportation resources are presented and candidate solutions discussed. Modern analysis and design techniques are demonstrated and applied to typical transportation systems. Functional requirements in communications, data processing, sensors, vehicle and operator behavior, social and economic factors, and overall systems performance are described and evaluated for specific applications. Guest lecturers present selected topics.

Course Content Review of the current and projected air traffic control problem. Determination of functional requirements to match system demand to system capacity. Presentation of transportation concepts and systems that are candidate solutions for air traffic control—including ground terminal capacity. Review of the current ground transportation dilemma and candidate solutions for rail, highway, and urban traffic problems. Advanced ground transportation concepts, designs, and vehicular requirements including command and control systems for rail, rapid transit, and PRT (personal rapid transit) systems. Design and simulation of transportation systems. Social and economic considerations. Specific topics that reflect the class interest are discussed.

Faculty: Dr. Albert M. Colella
Systems Engineer
Department of Transportation

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning February 20, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1762 Applied Reliability

An introduction to the theoretical and practical aspects of component reliability analysis and evaluation. Part and circuit failure distributions are examined with a view toward formulating the probabilistic laws governing life expectancy. Behavior of parts and materials under operating and environmental stresses leads to the modern techniques of reliability prediction and allocation. The applicable laws of chance are combined with the expected, predictable statistics of wearout to describe prevalent failure mechanisms in electrical and mechanical devices comprising typical components and circuits. This information is used to develop the most effective tools for device reliability improvement. The course serves as an introduction to course 1763, Reliability Engineering.

Course Content Definitions of device failure, part failure densities and historical sources of part failure data. Reliability under stress and safety margins in design. Effect of part variability on circuit or sub-system performance. Reporting and analysis of failure data, corrective action procedures, and failure modes and effects analysis (FMEA). Reliability design reviews and up-to-date techniques used for assuring high probability of satisfactory circuit operation. Computer aids to reliability analysis (AEDCAP, NET-1, etc.) and reliability evaluation through life testing and demonstration tests.

Faculty: Mr. Avery H. Hevesh
Principal Engineer
Raytheon Company

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1763 Reliability Engineering

A systematic treatment of reliability theory applied to the solution of system and circuit problems. Intended for design, system and reliability engineers, this course provides an understanding of factors influencing hardware performance longevity, its measurements, and improvement. From the model-

ing of simple, non-redundant systems through complex, multi-moded systems, the concepts emphasize quantitative treatment of system success using the tools of probability, transition diagrams, and matrix algebra. Systems with requirements for low maintenance and high operational readiness are examined in view of practical constraints, economic and otherwise. Familiarity with frequency and cumulative distributions and the statistics used in failure data analysis is presumed.

Course Content Stochastic processes, Markovian processes, matrices. Signal flowgraph representation of multi-state systems. System success modeling, effects of redundancy, cold and hot standby, effects of switching, repair/replacement policies. Availability of maintained systems—both serial and redundant. Constraints of cost, weight, size, manpower resources. Systems effectiveness measures—military and commercial. Computer aids to reliability analysis.

Faculty: Mr. Avery H. Hevesh
Principal Engineer
Raytheon Company

Monday evenings, 5:00 to 7:00, 14 sessions, beginning February 24, 1975. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1764 Electronic Component Engineering

For design engineers, this course discusses key characteristics of electronic components and the criteria for selecting and explicitly describing the best part for a given application. It presents the techniques used to choose a component's significant performance parameters, and how to control these properties with specifications. The course enables the participant to avoid reliability problems caused by underspecification or excessive cost due to overspecification.

Course Content Methods of characteristic determination, product search, data interpretation. Use of MIL Specs and Standards. Resistors: carbon composition; film-carbon, metal, and metal oxide; wirewound power and precision; variable-carbon, cermet, and wirewound. Capacitors: ceramic; mica; paper/plastic; aluminum and tantalum electrolytic; variable. Inductors and transformers: rf chokes; air core and ferrite core, af chokes; air core and iron core; rf transformers; af and power transformers. Relays: conventional crystal can (hermetically sealed), reed, and special (including opto-isolators). Switches: slide, rocker, toggle, micro, pushbutton, piano key, and rotary. Connectors: cable, rack and panel, printed circuit. Diodes and transistors: small signal, power, and thyristors. Integrated circuits: bipolar digital, bipolar linear, and MOS. Specification writing.

Faculty: Mr. Richard F. Powell
 Director of Research & Development
 KLH Research and Development Corporation

Tuesday evenings, 7:15 to 9:15, 10 sessions, beginning October 8, 1974.
 Tuition: \$130, including instructional material. Location: Weston High School, Weston, Massachusetts. Two Continuing Education Units.

1766 System and Design Practices in Maintainability

A treatment of maintainability theory and practice for engineers, managers, and others who have an interest in the requirements of MIL-STD-470 (maintainability programs), MIL-STD-471 (maintainability demonstration testing), and MIL-HDBK-472 (maintainability prediction techniques). Corrective and preventive maintenance considerations for the designer of modern, complex electronic systems are covered with special emphasis on equipment availability and reduced life cycle costs. Application of principles to commercial product lines are also included with a view toward establishing decision criteria for maintenance crew size and skills, overhaul periods, and checkout test frequency. The course aids project managers in establishing and directing maintainability programs and in appraisal of program results. Familiarity with reliability and probabilistic aspects of systems effectiveness is helpful, but not required.

Course Content System success modeling with replacement/repair doctrines; formation of queues; availability of maintained systems—serial and redundant. Role of automatic fault location, and diagnosis and use of BITE (built-in test equipment). Constraints of manpower resources, maintainability data acquisition and data analysis. Impact of maintainability on spares provisioning and logistics planning, design techniques for minimizing mean-times to replace/restore. Effects on operational ability. Economic trade-offs. Repair/discard decisions.

Faculty: Mr. Avery H. Hevesh
 Principal Engineer
 Raytheon Company

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974.
 Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

1910 Pattern Recognition

The underlying principles of pattern recognition are presented. Emphasis is placed on techniques used in classifying data and extracting important decision parameters from that data. Participants gain familiarity with available

algorithms, as well as the thoughts and problems associated with new pattern recognition applications.

Course Content Introduction to pattern recognition. Use of: decision theory, geometric partitioning, learning, and adaptation. Applications chosen from: optical character recognition, target detection and identification, underwater sound, unmanned interplanetary probes, electro-cardiogram analysis, biological cell classification, speech recognition, as well as specific requests. Topics are weighted to reflect class interest.

Faculty: Mr. Paul Cooper
Consultant

Monday evenings, 5:00 to 7:00, 8 sessions, beginning October 7, 1974. Tuition: \$100, including instructional material. Location: Weston High School, Weston, Massachusetts. 1.6 Continuing Education Units. Also tentatively offered in the spring.

Note: Also see the following courses listed in the appropriate section:

- | | |
|------|--|
| 2460 | Systems Approach to Optical Instrument Design |
| 2862 | Laser Systems and Applications |
| 4712 | Digital Simulation Programming Languages |
| 4850 | Computer Science Seminar |
| 5250 | Microwave Systems Engineering |
| 5371 | Electronic Systems and Signals 1 |
| 5907 | Digital System Design and Architecture |
| 5909 | Principles and Design of Ultra-Reliable (Fault-Tolerant) Digital Systems |
| 5960 | Data Acquisition Systems 1 |
| 7100 | Operations Research |

Applied Sciences

2171 Luminous System Design and Evaluation

Practical aspects of light generation, control, and detection are presented. The underlying principles and techniques required to solve problems in illumination, information display, psychophysics and human factors, photometry, and photobiological and photochemical systems are discussed. Coverage includes: source selection and specification, system design and analysis, component and system performance, calibration, instrumentation and testing, and evaluation of ocular and dermatological hazards related to light.

Course Content Nomenclature and basic principles; calculations and flux transfer theory; reflectors, refractive devices, light control optics; components, filters, fiber optics; illumination in optical systems, projectors, copy devices. The eye and vision; colorimetry; psychophysical and psychological aspects of vision including quantitative evaluation of factors such as glare and the ability to assimilate information. Measurements and instrumentation; photobiological hazard analysis; radiant properties of light sources. Specific application topics such as the measurement and specification of LED's, light as a tool in medical treatment, illumination in photographic systems, solar simulators, detector calibration. Specific topics depend on class interest.

Faculty: Dr. Robert E. Levin
Engineering Consultant
GTE-Sylvania

Monday evenings, 5:00 to 7:00, 14 sessions, beginning February 24, 1975.
Tuition: \$175, including instructional material. Location: Burlington Campus. Three Continuing Education Units.

2180 Illumination Engineering

This course has been developed for engineers, architects, and others involved in the design and specification of lighting systems and equipment. It covers light sources, lighting equipment, lighting design methods, and lighting standards and criteria as an applied engineering subject. Participants are prepared to handle both routine and unique problems in the design of lighting systems and luminous environments.

Course Content Basic terminology; incandescent, fluorescent, and high intensity discharge lamps; preparation and interpretation of photometric data; calculation of illumination at a point due to point, line and area sources; calculation of average illumination by the zonal cavity method including non-rectangular rooms and luminance coefficients; design of interior natural lighting (daylighting), floodlighting, street lighting, and lighting for special applications; control of the luminous environment including visual comfort (VCP) and color; task and performance oriented criteria for illumination including equivalent sphere illumination (ESI); criteria standards and equipment for specific lighting applications.

Faculty: Dr. Robert E. Levin
Engineering Consultant
GTE-Sylvania

Monday evenings, 5:10 to 7:10, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Boston Campus.
Three Continuing Education Units.

2190 Solid-State Photodetectors

For optical and infrared scientists, systems engineers and technicians, this course covers fundamental principles and applications of solid state detectors of visible and infrared radiation. Dependence of photodetector performance on environment and materials properties is emphasized. Operating principles and characteristics of the major solid-state detector types are analyzed and consideration is given to detector-preamplifier matching problems. Recent developments in photodetector technology and applications are reviewed.

Course Content Introduction and overview of photodetection; definition and significance of terms. Properties of electromagnetic radiation. Properties of semiconductors. Theories of noise. Principles and properties of specific detector types: extrinsic photoconductors; intrinsic photoconductors; photovoltaic detectors; hot-electron detectors; phonon-drag detectors. Modern materials for solid-state photodetectors. Recent advances: high speed photovoltaics; heterodyne detection; optical mixing in detectors; other areas, depending on class interest.

Faculty: Dr. Jack F. Butler
Arthur D. Little, Inc.

Tuesday evenings, 7:00 to 9:00, 8 sessions, beginning October 8, 1974.
Tuition: \$110, including instructional material. Location: Burlington Campus. 1.6 Continuing Education Units.

2415 Principles of Photographic Systems

The dominant aspect of contemporary photographic technology is its broad range of applications in the amateur, scientific, industrial, medical, and reconnaissance fields. A broad exposure to photographic systems and the underlying technology in an applications oriented approach is provided. Principles, procedures, and instrumentation are examined. Semi-quantitative methods which find wide acceptance in design and evaluation are emphasized and distinguished from fundamental principles which provide basic insights but presently have limited utility. The program enables participants to completely specify photographic systems and components, and properly utilize photographic evaluation data.

Course Content Review of definitions and instrumentation for sensitometry. Characteristic curve. Tone reproduction. Spectral and geometric aspects of density measurement. Photographic spectroradiometry. Operational definitions of film speed. Relation to applications and camera operation. Spectral sensitivity. Reciprocity failure. Spectral characteristics of thermal sources, discharge sources, and representative phases of CIE daylight. Photographic optics; refraction; dispersion; first order properties and aberrations; OTF; apertures; depth of focus; field of view; perspective; image structure; MTF; granularity vs. graininess; Wiener spectrum. Psychophysical resolution measurements. Adjacency effects. Microdensitometry. Color photographic systems. Objectives of color reproduction. Munsell, CIE, and three filter color specification. Structure of integral tripack subtractive color films. Positive-negative, reversal, separation, and dye diffusion systems. Spectral characteristics of sensitized emulsions and dyes. Masking. Analytical sensitometry. Spectral Distribution Index. Psychophysical factors in color perception.

Faculty: Dr. Richard J. Becherer
Research Section Head
Polaroid Corporation

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974. Tuition: \$175, including instructional material. Location: Burlington Campus. Three Continuing Education Units.

2460 Systems Approach to Optical Instrument Design

This course is intended for scientists and engineers involved in the design and analysis of optical and electro-optical systems. Underlying concepts and procedures for evaluating multicomponent optical and electro-optical systems from their specifications are developed. Practical applications include: evaluation, scanning, photographic and image processing systems, and techniques.

Course Content Description of radiant flux in quantum, radiometric, and photometric units. Source-detector interaction using matching factor concept. Evaluation of signals and noise related to sensitivity, resolution, and detection probability in optical systems. Determination of the optical characteristics of a multicomponent lens system and ray tracing techniques. Calculation of image irradiance. Fourier transforms, impulse response, and optical transfer function measurements and calculation. Image sharpness and spatial filtering. Use of manufacturer's data and laboratory techniques in system design and evaluation.

Faculty: Mr. Faramarz Faramarzpour
Section Manager, Engineering Division
Polaroid Corporation

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974. Tuition \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

2860 Electro-Optical Systems Engineering

This course surveys the recent advances in lasers and laser technology with emphasis on the devices used in electro-optical system design. The physical properties and operating characteristics are presented for system components such as detectors, interferometers, modulators, and other optical devices. The principles of geometrical and physical optics are stressed in developing laser applications in spectroscopy, optical heterodyning, and optical data processing.

Course Content Physics of lasers. Survey of detector characteristics in the visible and infrared. Optical systems components. Applications in incoherent and coherent detection techniques. Fundamentals of optical imaging techniques and their application to data processing and holography.

Faculty: Mr. Jonathan Fridman
Program Manager
Raytheon Company

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

2862 Laser Systems and Applications

Progress in many areas of electro-optics, the emergence of novel lasers with extended power and wave-length characteristics are generating new opportunities for laser applications to a wide variety of industrial and scientific

problems. This seminar series covers the principles and application of laser systems to numerous areas including: materials and metalworking, micro-electronics, holography, optical data processing, information storage and display, spectro-chemical analysis, optical radar, air pollution, biology and medicine. The program is intended for physical scientists, engineers, and technical managers interested in current and potential applications of lasers.

Faculty:

Laser Principles and Meterology

Dr. Shaoul Ezekiel
Associate Professor
Department of Aeronautics
& Astronautics
Massachusetts Institute of
Technology

Optical Components & Coatings

Mr. Graeme Hennessey
President
Valpey Corporation

Dye Lasers

Dr. Irving Itzkan
Chairman, Optics Committee
Avco Everett Research
Laboratory, Inc.

Lasers in Spectrochemistry

Mr. Frederick Brech
Director of Marketing

Dr. Charly D. Allemand
Senior Scientist
Jarrell-Ash Division
Fisher Scientific Company

Display Devices & Technology

Mr. Joseph E. Bryden
Technical Director of Advanced
Display Technology
Raytheon Company

Magneto-Optics in the Far Infra-Red

Dr. Benjamin Lax, Director
National Magnet Laboratory
Massachusetts Institute of
Technology

Laser Air Pollution Measurements

Dr. Everett D. Hinkley
Staff Member, Lincoln Laboratory
Massachusetts Institute of
Technology

The Evolution & Development of the CO₂ Laser

Dr. Thomas Deutsch
Principal Scientist
Raytheon Company

Industrial Applications

Dr. David Whitehouse, Manager
Laser Advanced Development
Center
Raytheon Company

High Power Lasers & Applications

Mr. Edward V. Locke
Manager, Commercial High Power
Lasers
Avco Everett Research Laboratory,
Inc.

Medical Applications

Dr. Samuel Fine, Chairman
Department of Biophysics and
Biomedical Engineering
Northeastern University

Detectors: Devices & Technology

Dr. Robert M. Broudy
Principal Research Engineer
Honeywell Radiation Center

Optical Radar

Mr. Jonathan D. Fridman
Program Manager
Equipment Development
Laboratories
Raytheon Company

Optical Communications

Dr. William W. Ward

Leader, Optical Communications
Group

Lincoln Laboratory

Massachusetts Institute of
Technology

Business Trends in the Electro-optics Industry

Mr. Howard Rausch

Editor

"Laser Focus" Magazine

Course Coordinators: Dr. Samuel Fine, Mr. Jonathan D. Fridman

Wednesday evenings, 7:00 to 9:30, 15 sessions, beginning February 19, 1975.

Tuition: \$175, including instructional material. Location: Burlington Campus. Three Continuing Education Units.

3000 Introduction to Infrared Spectroscopy

For scientists and technicians, this course discusses design principles, sample preparation, operating procedures, and applications of infrared spectroscopy systems. The course enables the participant to prepare the infrared spectrum of any physical material, determine the composition of mixtures, and identify unknown materials. Laboratory sessions comprise approximately 25 percent of the program. The recommended prerequisite is a chemistry, physics, and math background equivalent to the first two years in a college science curriculum.

Course Content Introduction and overview of major applications. Theory and description of the infrared spectrophotometer. Instrument calibration and principles of operation. Sample preparation. Infrared spectra of solids, liquids, gases, mixtures, polymers, copolymers, and other materials. Characteristic absorptions. Interpretation of spectra. Qualitative and quantitative analysis. Applications in: manufacturing, chemistry, medicine, quality control, and materials science. Discussion of applications are weighted to reflect class interest.

Faculty: Dr. Patrick L. Sciaraffa
Consultant

Thursday evenings, 7:15 to 9:15, 8 sessions, beginning October 10, 1974.

Tuition: \$110, including instructional material. Location: Weston High School, Weston, Massachusetts. 1.6 Continuing Education Units. Also tentatively offered in the spring.

3005 Materials Identification — Instrumentation Methods and Application

This applications-oriented course enables participants to select the appropriate instrumental method for the qualitative and quantitative identification of physical materials. Participants are encouraged to discuss work-related problems such as those arising in quality control, production, research or development involving materials identification. Sessions at local industrial and university laboratories provide hands-on experience. Factors affecting instrumentation services, availability, and costs are also discussed.

Course Content Underlying concepts, sample preparation, operating procedures, data analysis, and application of infrared, ultraviolet and visible spectroscopy, gel permeation chromatography of polymers, x-ray fluorescence, vapor phase chromatography, and atomic absorption.

Faculty: Dr. Patrick L. Sciaraffa
Consultant

Mr. Robert Cooley
Director of Technical Training
Waters Associates

Dr. Barry L. Karger
Professor of Chemistry
Northeastern University

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning February 20, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

3010 Introduction to Mass Spectroscopy

For scientists and research technicians, this course discusses design principles, operating procedures and applications of mass spectroscopy systems. The course enables the participant to calculate the key system parameters, evaluate system performance, rate different instruments for specific applications and assist in making purchasing decisions. Participants will increase their skills in using and trouble-shooting mass spectrometers as well as readily identify new applications and techniques. A lecture/workshop format will be used throughout the course and field visits to mass spectroscopy installations are planned. The recommended prerequisite is a chemistry, physics, and math background equivalent to the first two years in a college science curriculum.

Course Content Introduction and overview of major applications. Description and function of mass spectrometer system elements: sample inlet, sample ionizer, mass analyzer, ion detector, and data readout. Description of mass analyzers and their mode of operation. Definition and calculation of: resolving power, sensitivity, abundance sensitivity, time response, detector system performance, noise limitations, mass discrimination, pumping systems and gas flow. Sample introduction and ionization. Methods of measuring small ion and electron currents and handling data. Interpretation of mass spectra. Applications in chemistry, biology, medicine, vacuum science, geology, materials science, oceanography, forensic science, and nuclear energy. Discussions of applications are weighted to reflect class interests.

Faculty: Dr. Donald J. Marshall
Director of Research and Development
Nuclide Corporation

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

Note: Also see the following course listed in the appropriate section:
6800 Vacuum Processes and Systems

Materials Science

3102 Application & Properties of Polymeric Materials

Organic polymers are surveyed relating physical properties to molecular structure. Material selection, design procedures, and fabrication methods are covered to enable the participant to optimize all phases of component design. Reliability and inservice behavior are examined, and cost trends in polymers are discussed.

Course Content Introduction to polymer chemistry, polymer selection. Fabrication methods: machining, injection molding, casting, blow molding, extrusion, calendering, forming and finishing techniques. Designing with polymers. Physical properties: stress, strain, elasticity, hardness, toughness, fatigue, thermal, electrical insulation and conduction, and optical. Chemical properties: resistance to organic solvents, acids, caustic, and chemical compounds. In-service behavior, failure modes, new materials, composites, foams and expanded polymers, and cost considerations.

Faculty: Dr. Patrick L. Sciaraffa
Consultant

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 8, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

3220 Properties and Application of Ceramics

For materials and design engineers, the application of ceramics based on an understanding of their properties is emphasized. The course enables participants to effectively interact with suppliers on specific applications and innovate designs through the unique attributes of ceramics. New ceramic materials are surveyed. Design techniques, selection criteria, and evaluation methods are described. Topics are weighted to reflect class interest.

Course Content Introduction: bonding, crystal structure, defect structure, microstructure, and fabrication methods. Electrical and magnetic properties and applications: band structure, electrical conductivity, dielectric properties and materials, magnetic properties and materials for memory, microwave and permanent magnet applications, piezoelectric properties and materials. Optical properties and applications: passive optical properties, fundamental

properties and laws, color, thick and thin coatings, fiber optics, windows and active optical properties to include lasers, non-linear optical materials, detectors, modulators, and optical storage devices. Structural properties and applications: brittle behavior, plastic behavior, composites, strengthening, fatigue, hardness, thermal shock, designing to a stress level.

Faculty: Dr. William Rhodes
Member, Technical Staff
GTE-Laboratories
Dr. Dennis Readey
Manager, Materials Laboratory
Dr. Charles B. Willingham
Senior Principal Research Scientist
Raytheon Company

Monday evenings, 7:15 to 9:15, 14 sessions, beginning February 24, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

3225 Ceramic Processing: Sintering and Hot Pressing

For engineers and technicians confronted with the problems of producing dense polycrystalline ceramic materials. Underlying principles of each fabrication step are described to enable participants to adjust their process to achieve desired materials characteristics.

Course Content Introduction. Basic phenomena: diffusion, defects, surface energy, and structure. Powder characteristics affecting densification. Steps in the sintering process including cold forming methods such as isostatic pressing, extrusion, and doctor blading. Standard ambient hot pressing, press forging, and powder vehicle shape pressing. Microstructure characterization is presented with emphasis on directing remedial adjustment of key process steps.

Faculty: Dr. William H. Rhodes
Member, Technical Staff
GTE-Laboratories

Tuesday evenings, 7:15 to 9:15, 7 sessions, beginning October 8, 1974.
Tuition: \$100, including instructional material. Location: Weston High School, Weston, Massachusetts. 1.4 Continuing Education Units.

3250 Powder Metallurgy: Applications and Techniques

The selection and design of parts to be produced by powder metallurgy is discussed. The methods and procedures for producing sintered parts are

covered in sufficient detail to develop selection criteria and design guidelines. Materials and processes used to attain unique or superior mechanical properties are described along with approaches to reducing overall manufacturing costs of components and assemblies. Case studies and work-related problems submitted by participants are discussed. The course is intended for industrial, value, and design engineers as well as technical managers.

Course Content Methods of making metal powders and the effects on part properties. Compacting powders mechanically, isostatically, and by slip casting. Design limitations imposed by the compacting methods and equipment; problems associated with compacting. Sintering of metal powder, effects of atmosphere, time, and temperature on mechanical properties, and size change. Practical problems in sintering and effect on tolerances. Finishing operations: coining, heat treating, and machining; effects on tolerances and properties. Estimating the cost of sintered parts. Forging and hot isostatic pressing of powder preforms. Design guidelines for press and sintered parts, forged parts, and hot isostatically pressed parts. Numerous case studies.

Faculty: Dr. Leander F. Pease III
Partner
Powder-Tech Associates

Thursday evenings, 7:15 to 9:15, 8 sessions, beginning October 10, 1974. Tuition: \$110, including instructional material. Location: Weston High School, Weston, Massachusetts. 1.6 Continuing Education Units. Also tentatively offered in the spring.

3330 Materials and Processing Techniques for Hybrid Integrated Circuits

The materials involved at each level of hybrid integrated circuit fabrication are described. Thin film, thick film, and silicon technologies are discussed with an emphasis on providing both the capabilities and limitations of these major IC divisions. Available passive devices and their realizable characteristics are specified. Active devices in silicon are explored from a physical design point of view (e.g., flip-chip vs. beam lead). Deposition, layering, measurement, and evaluation techniques for films are presented. Modern circuit and component manufacturing methods are discussed. Practical aspects for "hybridizing" are examined (e.g., microbonding, appliquéing, inter- and intra-connecting, and encapsulating). Topics are weighted to reflect class interests.

Course Content IC definitions. Substrates, passive and active. Deposition and layering techniques, including sputtering, evaporation, firing, plating,

anodization, oxidation, diffusion, and epitaxy. Laser trimming. Conductor systems for inter- and intra-connections, and crossovers. Materials, processes, and capabilities of resistors, capacitors, and inductors. Microbonding of active devices. Beam lead vs. flip-chip. Ramifications of medium and large scale integration with regard to fabrication, yields, and tests. Overall hybrid packaging philosophy. Computer and machine aids for device design, fabrication, and adjustment.

Faculty: Dr. Robert J. Dow
Member, Technical Staff
Bell Telephone Laboratory

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974. Tuition: \$175, including instructional material. Location: Burlington Campus. Three Continuing Education Units.

3340 Thin Film Deposition Techniques

For engineers and technicians involved in thin film deposition by evaporation, sputtering, or chemical vapor deposition. Participants develop an understanding of important deposition parameters and their relationships to film microstructures and properties as well as an increased ability to systematically solve processing problems. Lectures and discussions are directed toward topics of class interest. Two years of college level science or experience with deposition equipment will provide adequate background.

Course Content Introduction to the nucleation and growth of thin films. Crystalline and amorphous films. Epitaxy and orientation effects. Processes: thermal evaporation, sputtering, chemical vapor deposition. Influence of deposition rate, temperatures, and pressures on deposit properties. Film composition. Stress effects. Thin film adhesion. Residual atmosphere interactions, contamination effects. Relationships among film microstructures, properties, and deposition conditions. Applications of class interest.

Faculty: Dr. Charles B. Willingham
Dr. Alan W. Swanson
Senior Principal Research Scientists
Raytheon Company

Tuesday evenings, 5:00 to 7:00, 6 sessions, beginning October 8, 1974. Tuition: \$80, including instructional material. Location: Weston High School, Weston, Massachusetts. 1.2 Continuing Education Units.

3351 The Growth and Characterization of Single Crystals

This course provides the technical background and understanding of crystal growth and characterization necessary for materials and property specification, sample evaluation, and comparison of alternative growth and characterization methods. In addition, the course provides a state-of-the-art review of various experimental techniques and their applications. Emphasis is directed toward achievement of specific properties based on an understanding of growth and characterization techniques. Designed for research scientists, development and design engineers, senior technicians, quality control specialists, and other technical staff members in electronics and associated industries.

Course Content Crystal Growth—Driving forces and kinetics: basic phase equilibrium; nucleation and growth theory. Phase transformation processes: solid-solid, congruent liquid-solid, incongruent (dilute) liquid-solid and vapor-solid phase transformations, growth from both high and low viscosity melts. Characteristic advantages and defects inherent to specific crystal growth processes. Solidification-interface shape and cellular growth, constitutional supercooling. Special problems: growth of crystals from liquids with high vapor pressures, growth of extremely high melting point materials, convection in melts. Recrystallization, polymorphic phase transformations, Czochralski, Verneuil, Bridgman, floating zone, liquid phase and vapor phase (CVD) epitaxial growth processes; liquid encapsulated synthesis of and crystal growth from melts with high vapor pressure; resistance Rf, arc flame, and laser heat sources.

Characterization—Chemical analysis: bulk chemistry (qualitative and quantitative), trace analysis, composition gradients, surface chemistry, phase constituents, lattice parameter. Structural analysis: surface structure and morphology, crystallinity, perfection, dislocation density, precipitation, segregation, striations, lineage, thin film structures, epitaxy, lattice strain.

Experimental methods—Optical microscopy, scanning electron microscopy, replica and transmission electron microscopy, X-ray Laue, Berg-Barrett and Lang X-ray topography, X-ray diffraction, chemical analysis methods including X-ray fluorescence, electron probe microanalysis and nondispersive X-ray analysis.

Faculty: Dr. Edward T. Peters
Dr. Jacques M. Steininger
Arthur D. Little, Inc.

Tuesday evenings, 5:00 to 7:00, 12 sessions, beginning October 8, 1974.
Tuition: \$165, including instructional material. Location: Burlington Campus. 2.4 Continuing Education Units.

3450 Electrochemical Power Sources

This course presents an overview of battery technology and introduces the underlying principles and operational characteristics of primary and secondary cells. Power sources, currently available or under development, are considered with the objectives of enabling participants to select the best device for a particular application as well as suggest novel applications for new devices.

Course Content Historical introduction. Fundamentals: thermodynamics and chemistry; loss mechanisms; criteria for performance evaluation. Description of chemistry and operating principles, operating characteristics, limitations, and typical applications for: dry cells; alkaline cells (manganese, mercury, silver); molten salt batteries; non-aqueous systems; solid electrolyte cells; and fuel cells. Selection criteria and applications including portable electrical and electronic equipment; starting, lighting and ignition; vehicular propulsion; load leveling and energy storage. Cost considerations.

Faculty: Dr. James J. Auburn
Member, Technical Staff
GTE-Laboratories

Thursday evenings, 5:00 to 7:00, 5 sessions, beginning October 10, 1974.
Tuition: \$70, including instructional material. Location: Weston High School, Weston, Massachusetts. One Continuing Education Unit.

3700 Introduction to Industrial Chemistry

The underlying chemical aspects relating to industrial processes, products, and safety are discussed. The methods of product development, chemical specifications, monitoring of chemical processes, and quality control are covered. Work-related problems are solicited from the class, and application areas are weighted to reflect class interest.

Course Content Types of chemical compounds; description of solvents, chemicals, plastics, and other materials; introduction to organic chemicals; chemicals commonly used in industrial processes; safe handling procedures; toxicology; pertinent OSHA regulations; methods of product development; and monitoring of chemical processes. Industrial applications such as: electronics, plating, chemical manufacturing, fabrication of plastics, textiles, leather, printing, and pollution control.

Faculty: Dr. Patrick L. Sciaraffa
Consultant

Dr. John M. Peters
Associate Professor of Occupational Medicine
Harvard University

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

Note: Also see the following courses listed in the appropriate section:

- 3000 Introduction to Infrared Spectroscopy
- 3005 Materials Identification: Instrumentation Methods and Applications
- 3010 Introduction to Mass Spectroscopy
- 6010 Soldering and Brazing
- 6481 Failure Analysis
- 6800 Vacuum Processes and Systems
- 9680 Concrete and Aggregate Technology

Computational Sciences

4106 Applied Statistics

Statistical techniques are developed and applied to a broad variety of actual problems. The course includes: statistical tests of most frequent use; decision theory and some of its applications; design and analysis of industrial experiments; and use of computers in statistical analysis. Some background in elementary probability theory and statistics is assumed.

Course Content Sampling, statistical inference, F test, χ^2 test, goodness of fit, Kolmogorov-Smirnov test. Decision theory and decision analysis hypotheses testing, estimation theory, and least squares methods. Analysis of variance, balanced experimental design, factorial and fractional factorial design. Use of computers for statistical computation.

Faculty: Mr. Paul Cooper
Consultant

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning October 10, 1974
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

4125 Introduction to Experimentation

This tape-lecture series presented in cooperation with M.I.T.'s Center for Advanced Engineering Study develops a systematic approach to the collection, analysis, and reporting of experimental data. The major topics studied in the course are instrument characteristics, measurement errors, statistical analysis, plotting of functional relationships, correlation, and technical reporting. Guest lecturers will cover selected topics in addition to the video presentations developed by Professor Ernest Rabinowicz.

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including texts, study guides and notes. Location: Weston High School, Weston, Massachusetts. Make-up sessions are available at Weston High School. Three Continuing Education Units. Also tentatively offered in the spring.

4712 Digital Simulation Programming Languages

This course offers a broad and highly functional treatment of digital simulation programming languages and their application for analysts, engineers, programmers, and managers. Not limited to a single technique or language, it introduces simulation language structures and application suitability, and demonstrates problems solved by several simulation languages.

Course Content Theory, structure, and organization of digital computer simulation languages for both discrete and continuous systems. Comprehensive study of simulation languages with programmed examples for GPSS, SIMSCRIPT, SIMPLI, CSMP, CSSL, GASP, DYNAMO and others. Selection and suitability of these languages for specific applications, with interpretation and analysis of results. Current and future uses of these languages and advances in simulation software packages.

Faculty: Mr. Michael J. O'Sullivan
Senior Staff Analyst
Honeywell Information Systems, Inc.

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

4804 Introduction to Compiler Design

The underlying principles of compiler design are introduced. The relationships of a compiler to other computer system components (both hardware and software) are described. A compiler for a PL/1 subset is used as a discussion model; however, the general design principles are equally applicable to other higher level languages (COBOL, FORTRAN, BASIC, etc.). All pertinent PL/1 language elements are developed in class, and comparisons of commonly used language compilers are made. Recommended for application and systems programmers who are interested in the development of compiler components and data structures, general design principles, common compiler problems, and compiler/operating system interfaces.

Course Content Introduction to compilers. Human compilation of several language elements. Lexical analysis. Syntax analysis. Storage allocation. Semantic analysis. Error diagnosis, correction, and recovery. Object code generation. Symbol tables (identifier table, name table, etc.). Internal compiler interfaces. Compiler tradeoffs. Operating system interface of both compiler and object code. Major language considerations in general compiler designs. Complete compiler flow. Compiler construction tools. Comparison of compiler architectures: batch, interactive, and incremental compilers. Compiler vs. interpreter. Compiler project management. Summary: elements of a good compiler.

Faculty: Mr. Rodger C. Blair (Course Coordinator)
Senior Compiler Designer
Mr. James D. Mills
Supervisor of Scientific Software Engineering
Digital Equipment Corporation
Mr. Ronald J. Ham
Manager, Compiler Development Department
Honeywell Information Systems, Inc.

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning October 10, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

4806 Principles of Compiler Design

This course provides an in-depth investigation of selected topics in compiler design. It is aimed at the experienced programmer who has completed an introductory course in compilers or understands the basic concepts through experience. The range of tradeoffs in compiler implementation and the methods of implementing specific choices from this range are covered.

The vital areas of a compiler are thoroughly analyzed, including lexical analysis, syntactic analysis, table handling, local optimization, and code generation. Advanced topics such as extensible languages are also discussed.

These topics are treated within the context of the course's three overall objectives. First, to provide participants with a background sufficient to easily follow current developments. Second, to give participants pragmatic information useful for the analysis or synthesis of actual compilers. Finally, to gain an appreciation of similarities and differences between different compilers through case studies and guest lectures on the FORTRAN, COBOL, PL/1, and BLISS languages.

Faculty: Dr. James R. Bell
Manager of Research & Development
Digital Equipment Corporation

Guest Lecturers: Mr. Rodger C. Blair
Senior Compiler Designer
Dr. Ronald F. Brender
Supervisor of Fortran Development
Mr. James D. Mills
Supervisor of Scientific Software Engineering
Digital Equipment Corporation

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

4808 Time-Sharing Data Processing Systems

Computer development and application growth in the next decade will emphasize interactive, terminal-based systems. Such hardware-software capability will characterize the average, rather than only the exceptional installation. This course examines these time-sharing systems from both a designer and user standpoint. The course covers the critical concepts of time-sharing system design as well as the types of capabilities that various terminal users expect from a time-sharing system.

This course is designed for data processing managers, programmers and computer designers. Participants should have familiarity with computer hardware elements, at least one higher level language, and concepts of an operating system. The course enables participants to understand and evaluate the principles, characteristics, and potential of time-sharing computer systems.

Course Content Spectrum of terminal-based systems; teleprocessing versus time-sharing, degrees of interactiveness. Terminal types and communication concepts and requirements. Memory management techniques; swapping and paging. Time-slicing algorithms, single versus multiple level, fixed versus dynamic. Command language capabilities. Types of users and applications. Performance criteria, measurement, and evaluation.

Faculty: Mr. Thomas E. Digan
Senior Engineer
IBM Corporation

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

4809 Virtual Memory and Automatic Memory Management

Computer application growth of the 70's emphasizes on-line data base systems requiring enhanced multi-programming. Virtual memory and automatic memory management are the most significant contributors to enhanced multiprogramming during this period.

This course, for data processing managers, operations managers, and system programmers, discusses the techniques for managing virtual memory address space and the control capabilities for utilizing real memory. User options for handling variable size segments and pages are covered in depth. Participants should be familiar with operating systems, table structures, scheduling algorithms, and access methods. The course enables participants to understand the principles of virtual memory and how to most effectively

apply them to: improve system efficiency, reduce programmer intervention, and provide program independence.

Course Content Scheduling algorithms; application of re-entrant code; memory management techniques using extended keys; effect of segment and page size on performance; effect of real memory space on performance; types of applications and their benefits from virtual memory.

Faculty: Mr. Thomas E. Digan
Senior Engineer
IBM Corporation

Monday Evenings, 7:15 to 9:15, 12 sessions, beginning February 24, 1975. Tuition: \$160, including instructional material. Location: Weston High School, Weston, Massachusetts. 2.4 Continuing Education Units.

4815 Teleprocessing Software

For programmers, systems analysts, and data processing managers, this course discusses the underlying concepts of software development for on-line systems. The design, coding, testing, tuning, and problem diagnosis of teleprocessing systems is described. The various levels of teleprocessing software are examined from the most basic channel programming techniques to advanced data communication monitors. Practical examples are used extensively. Familiarity with assembler language coding and computer hardware architecture is desirable.

Course Content T/P concepts, terminology, and hardware requirements. Methods of establishing contact in switched and leased line configurations. Contention and polling/addressing modes. T/P line control using synchronous and start/stop examples. Use of line control diagrams. Functions of transmission control units. Channel commands. Channel program coding techniques for T/P programs. Error recovery techniques. Coding using a basic T/P access method such as BTAM. The various macros, buffering techniques, and error recovery and recording techniques. General rationale for and capabilities of a control program. Teleprocessing monitors such as TCAM, INTERCOMM, IMS, ENVIRON/1, and CICS as control program examples. Consideration and comparison of queuing, scheduling, checkpoint/restart, and application program interface techniques. The generation of a typical control program. Coding of a message processing program operating under the monitor. Diagnostic and testing methods: simulated testing and line tracing. Performance and turning of teleprocessing systems. Front end control units along with their software functions. The IBM 3705 along with the emulator and network control program is used as an example. Future T/P access methods. High level mapping support techniques for CRT Terminals.

Faculty: Mr. Fred H. Kauffman
 Manager of Systems Technology
 Zayre Corporation

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974.
 Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

4827 CODASYL Database Systems

A database language specification has been developed by CODASYL which can claim to be a workable industry-wide standard. This course reviews the general requirements for a database system, surveys previous systems, and describes the underlying concepts of the CODASYL Database specification. Versions of this system currently being implemented are discussed. The Data Description Languages and Data Manipulation Languages are covered in sufficient depth to fully develop cases in manufacturing and banking. An overview of the design of major software components of an implemented system is also presented. Intended for systems analysts and programmers, EDP managers, and others working in business data processing.

Faculty: Mr. Dennis S. Ward
 Manager, Data Access Department
 Honeywell Information Systems, Inc.

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning October 10, 1974.
 Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

4850 Computer Science Seminar

The difficulty of establishing a unified systems approach to digital computers is a principal problem in computer science. The advent of complex software operating systems, advanced hardware structures, and demanding applications has further complicated this problem. New techniques are needed to realistically portray digital computer systems over a broad spectrum. These weekly lectures conducted by leading contributors present the techniques, considerations, and means necessary for understanding the full significance of digital computer systems within a practical framework. The program is intended for professionals actively engaged in computer systems development seeking a comprehensive treatment of the current and future status of digital computer technology.

Faculty:

Advances in Computer Architecture

Mr. Alan J. Deerfield

Raytheon Company

Operating Systems

Mr. William J. Heffner

Honeywell Information Systems, Inc.

Compiler Design

Dr. James Bell

Digital Equipment Corporation

Virtual Memory Management

Mr. Thomas E. Digan

IBM Corporation

Event Management Systems

Mr. Ross Park

Honeywell Information Systems, Inc.

Data Communications Systems

Mr. Gerald E. DuBois

C. I. S. Inc.

Computer Organization and

Microprogramming

Mr. Paul Barr

Raytheon Company

Minicomputers and Industrial

Automation

Mr. Dominick J. Carlino

Western Electric Company

Database Systems

Mr. Charles W. Bachman

Honeywell Information Systems, Inc.

Digital Computer Displays

Dr. Donald R. Haring

Comptek, Inc.

Microelectronics and LSI

Mr. Herbert Sobel

Raytheon Company

Software Simulation and

Organization

Mr. Michael J. O'Sullivan

Honeywell Information Systems, Inc.

Advances in Computer Peripherals

Mr. Thomas Whearty

IBM Corporation

Wednesday evenings, 7:15 to 9:30, 14 sessions, beginning February 19, 1975. Tuition: \$200, including instructional material and coffee break. Location: Henderson House, Weston, Massachusetts. Three Continuing Education Units.

7435 Interactive Computer Graphics

This course enables the participant to estimate requirements, evaluate systems, justify use and understand the problems and opportunities of interactive computer graphics. The course provides the background to perform an operational analysis, determine system requirements and specifications, understand current and future design concepts in graphics systems and their integration into operational information processing systems. This graphics-user-oriented program emphasizes system aspects and problems rather than detailed engineering design, although the design concepts of graphics hardware and software are covered. In addition to equipment demonstrations, participants will get hands-on experience at a graphics facility.

Course Content A survey of current interactive computer graphics input and output devices. Graphic input devices: keyboard and cursor, digitizers, data tablets, light pens, joysticks and trackballs. Dynamic graphic output devices: random deflection refreshed CRT's, direct-view storage CRT's, scanned or TV CRT's, scan converters. Hard copy graphic output devices: plotters, dry silver photographic, electrostatic. Measuring the performance of computer graphics devices. Supporting hardware: low-cost terminals for timeshared computers and dedicated mini computers, standalone graphics systems, high-performance graphics systems. Hardware configurations for computer graphics applications. Supporting software: software structures, standard graphics routines such as plotting, graph paper, scaling, windowing; applications software. Organization and operation of a typical high performance standalone computer graphics system. Organization and operation of a typical computer graphics system on a time-shared computer. Impact of computer graphics on a computer operating system. Application: application analysis and graphic system selection, interfacing to standard routines, data organization. Integrated circuit design using interactive graphics—a typical application.

Faculty: Dr. Donald R. Haring
President
CompuTek, Inc.

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning February 20, 1975.
Tuition: \$175, including instructional materials. Location, Weston High School, Weston, Massachusetts.

Note: Also see the following courses listed in the appropriate section:

- | | |
|------|---|
| 1203 | Data Communications Systems |
| 1726 | Computer Simulation of Systems |
| 1737 | Industrial Application of Minicomputers |
| 1738 | Digital Computer Control |
| 5900 | Introduction to Digital Logic and System Design |
| 5924 | Survey of Small Computer Architecture |
| 5960 | Data Acquisition Systems 1 |
| 7100 | Operations Research |

Electrical Engineering

5101-5102 Introduction to Electricity, Circuits, and Machines I & II

This 2-part program covers the underlying principles of electricity and the operating characteristics of electrical components and machines. Equipment specifications and selection criteria are covered. Numerous examples are used to illustrate key concepts. Work-related problems are treated in class. Commonly used devices are demonstrated in laboratory sessions or field trips. Part 2 assumes working knowledge of content in first course.

Course Content: Part I Electric current, resistance, and voltage. Ohm's Law. Series and parallel circuits. Wire gauges and measurements; temperature coefficients; line drop. Kirchhoff's Laws. Electrical and mechanical power, line loss. Alternating current: generation, frequency, current, voltage, and phase. Electrical measurements: instruments and techniques.

Course Content: Part II Magnetism; electromagnetic induction. Direct-current generators, motors and controls. Single and three-phase circuits; transformers and regulators. Alternating-current generators; polyphase induction, synchronous, single-phase motors. Circuit protection and switching equipment. Electronic devices. Meters. Topics are weighted to reflect class interests.

Faculty: Mr. Frederick F. Driscoll
Master Instructor
Wentworth Institute

Part I: Monday evenings, 5:10 to 7:10, 8 sessions, beginning October 7, 1974.
Tuition: \$90, including instructional material. 1.6 Continuing Education Units. Location: Boston Campus.

Part II: Monday evenings, 5:10 to 7:10, 12 sessions, beginning January 6, 1974.
Tuition: \$150, including instructional material. 2.4 Continuing Education Units. Location: Boston Campus.

Parts I & II - tuition: \$220

5216 Microwave Components & Antennas

The underlying engineering design and operating principles of microwave components and antennas are presented. Emphasis is placed on the functional aspects of these devices. The class is conducted in a lecture/workshop format, and work-related problems are solicited from the participants.

Course Content Review of applicable transmission line theory, modal analysis, and use of Smith Charts. Presentation of operating principles and design procedures for: rotary joints, diplexers, cavity filters, switches and couplers, dipoles and array antennas, reflector and optical antennas, horns, tracing antennas, and satellite rf systems.

Faculty: Dr. Leon J. Ricardi, Group Leader
Antennas & Propagation
Lincoln Laboratory
Massachusetts Institute of Technology

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5250 Microwave Systems Engineering

Important criteria involved in planning and engineering a microwave communication system is explained in a technical manner. Emphasis is placed on the microwave equipment and propagation characteristics. Bandwidth information rate and simple consideration of spectra are discussed. In-depth treatment of specific topics are provided upon request.

Course Content The fundamentals of guided and unguided wave propagation are reviewed in preparation of the calculations of path loss between terminals. The phenomena of refraction, reflectors, and ducting multipath, are described. The effects of weather, fading, etc. are discussed with respect to diversity compensation. Antennas and other microwave devices are analyzed and design methods indicated; modulation and coding are considered if time permits.

Faculty: Dr. Leon J. Ricardi, Group Leader
Antennas & Propagation
Lincoln Laboratory
Massachusetts Institute of Technology

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5371 Electronic Systems and Signals I

The first of two courses dealing with fundamental concepts on the operation of complex electronic systems. Even though these concepts are few in number and extremely powerful, the interrelationships and short-cuts in their application are often unclear in the minds of engineers.

The objective of the first course is to develop a thorough understanding of the means by which signals are characterized and a familiarity with time-frequency domain transform techniques. The development in each course is such that no mathematical preparation beyond elementary calculus is required. Emphasis is placed on the easily remembered "tricks" associated with the application of basic principles rather than rigorous mathematics.

Course Content Means of characterizing pulse, periodic, and random signals. Time and frequency domain transformations including the fast Fourier transform. Measurement of power density spectra. Introduction to linear systems.

Faculty: Dr. Richard W. Bush
Member, Technical Staff
Lincoln Laboratory
Massachusetts Institute of Technology

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5372 Electronic Systems and Signals II

This course examines the effect of linear and non-linear systems on signals and develops the principles of feedback, cross correlation, and the matched filter. The presentation assumes that participants have taken **5371** or have a working knowledge of elementary calculus and signal characterization techniques for the time and frequency domain.

Course Content Effect of linear and nonlinear systems upon signals. Flow graphs and feedback fundamentals. Communication system fundamentals including modulation, multiplexing, correlation, and the matched filter.

Faculty: Dr. Richard W. Bush
Member, Technical Staff
Lincoln Laboratory
Massachusetts Institute of Technology

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975.
Tuition: \$175, including instructional materials. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5420 Transistor Circuit Design I

A broad-based study devoted to the presentation of the necessary parameters and design procedures for transistor and solid-state circuit design. Emphasis is placed on the selection of devices and design techniques to obtain practical working circuits. Course material is taken from semiconductor texts and current electronics literature, including manufacturers' application notes.

Course Content Transistor fundamentals: structure of matter, energy levels, impurities, junctions. Small signal techniques: biasing, hybrid parameters, basic configurations, characteristic curves, low frequency circuits. Power amplifiers: Class A, B, AB; complimentary symmetry; power dissipation. Wideband amplifiers: high frequency parameters, bandwidth improvement, compensation techniques.

Worst-case design—nodal methods of analysis. Oscillators—feedback theory and basic circuits. Clamping and switching circuits: reactive elements and non-linear devices. Clipping and comparator circuits—diode-transistor combinations for waveform alteration. Basic logic circuits: buffers, gates, binary elements. Special devices.

Faculty: Dr. James K. Roberge
Associate Professor of Electrical Engineering
Massachusetts Institute of Technology

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5421 Transistor Circuit Design II

This second-term study is devoted primarily to circuits incorporating feedback techniques. Both linear and digital circuits are investigated in detail. Presentation assumes that all students have either completed Transistor Circuit Design I, or have a working knowledge of active region operation of transistors, biasing, and frequency response of various transistor connections.

Course Content Review of concepts from Transistor Circuit Design I: redevelopment of basic models. Feedback concepts: transform techniques, block diagram representation of system dynamics, reduction of block diagrams, stability considerations. Circuit examples: stabilized audio amplifier, voltage regulator, linear power amplification. Operational amplifiers, switching circuits, pulse generators. Devices: field-effect devices, avalanche devices, SCR's, varactor, and tunnel diodes. Electronic analog switches.

Faculty: Dr. James K. Roberge
Associate Professor of Electrical Engineering
Massachusetts Institute of Technology

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5435 The Operation and Application of Linear Integrated Circuits

Following a brief description of processing and fabrication techniques used for modern linear integrated circuits, circuit configurations which are well suited to integration are explained. The combinations of basic circuits used to realize operational amplifiers, comparators, power supplies, communication circuits, and other available units are described. Numerous examples of the application of linear integrated circuits to electronic system design are given. Familiarity with transistor circuit techniques, such as that provided by the 5420-5421 sequence is assumed.

Course Content Advantages and limitations of the six-mask epitaxial process. Realizable elements. Circuits exploiting the properties of matched transistors. Major emphasis is devoted to the monolithic operational amplifier from both the circuit and applications point of view. Feedback and stability considerations. Survey of other available integrated circuits including communication amplifiers, comparators, analog multipliers, d/a and a/d converters.

Faculty: Dr. James K. Roberge
Associate Professor of Electrical Engineering
Massachusetts Institute of Technology

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5900 Introduction to Digital Logic and System Design

Techniques of digital logic applied to the analysis and design of digital systems are discussed. Available logic devices, including the microprocessor, as system components are analyzed. Fundamental logic applications and the design of a hypothetical digital computer are developed.

Course Content Fundamental computer operation; the microprocessor as a logic element; number systems; numerical codes; boolean algebra, truth

table representation of logic; basic building blocks (AND, OR, NOT, NAND, NOR, D F/F, JK F/F, SR F/F); binary arithmetic algorithms; design of a hypothetical digital computer; logic applications.

Faculty: Mr. Paul Barr
Principal Engineer
Raytheon Company

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5901 Principles of Sequential Logic

The principles of synchronous and asynchronous sequential logic design are presented emphasizing their practical application in meeting system requirements. Numerous examples are used to illustrate design principles. Participants should be familiar with combinatorial logic.

Course Content NOR and NAND logic. Applications—BCD to binary, serial to parallel, parity generation, code to code conversion. Counters—synchronous, shift, Johnson, cascade, cascade binary counters with feedback, gateless counters. Binary rate multipliers. Sequential logic. State diagrams, reduction and secondary state assignment. Asynchronous logic. D to A converter techniques.

Faculty: Mr. Paul Barr
Principal Engineer
Raytheon Company

Monday evenings 7:15 to 9:15, 14 sessions beginning February 24, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5907 Digital System Design and Architecture

Using a practical systems approach, this course provides the participant with both introductory background and advanced techniques for the specification and design of special and general purpose computer-oriented systems.

Course Content Survey of numerical representations, binary arithmetic process of addition, subtraction and multiplication in fixed, floating point, real, complex and matrix forms. Introduction to digital systems architecture, considerations of system mission, error detection/correction, reconfiguration; machine and compiler software requirements for: uni-processors, multiprocessors, multicomputers, array processors, real time

task/mission processors, and general purpose signal processors. Control synthesis techniques for third, fourth, and fifth generation structures which respectively employ ICP, MSI and LSI logic gate implementations. Interactions between computer memories, central processing units, bus communication, input-output (I/O) and peripheral equipments. Logic module partitioning, diagnostic and computer-aided design techniques. Scientific application seminars on student selected subjects, e.g.: multi-mode radars, process control, test/trainer facilities, signal processors, communication control, displays, and command control systems.

Faculty: Mr. Herbert S. Sobel
Manager, Digital Systems Laboratory
Raytheon Company

Thursday evenings, 5:00 to 7:00, 14 sessions, beginning October 10, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5909 Principles and Design of Ultra-Reliable (Fault-Tolerant) Digital Systems

This course, for digital systems designers and computer architects, applies the principles of ultra-reliability to the conception and design of fault-tolerant, self-repairing digital systems. Techniques are employed from the component level through complete system development. Practical examples are used throughout to illustrate the concepts. Participants should have familiarity with computer logic and digital systems techniques.

Course Content Basic component reliability criteria; fundamentals of reliable computer organization; basic probability theory, reliability; redundancy for reliability at systems level; redundancy for reliability in logic circuitry; principles of error detection (algebraic, arithmetic, etc.); arithmetic processor implementation with error-detecting codes; memory system organization with self-repair; bus structure with protective redundancy; fault tolerant counter design; case studies of existing fault tolerant computer systems; computer system organization for fault tolerance and self-repair; fault diagnostics in logic; fault diagnostics in computer systems.

Faculty: Mr. Paul Barr
Principal Engineer
Raytheon Company

Thursday evenings, 5:00 to 7:00, 14 sessions, beginning October 10, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

5913 Computer Organization and Microprogramming

An understanding of computer organization and microprogramming operation is developed by direct observation of the computer's step-by-step, instruction-by-instruction operation using Computer Design Language (CDL). This highly descriptive, nonprocedural, register transfer language makes an indepth description possible for various computer architectures.

The CDL is described by illustrating simple, logical organizations such as comparators and stored carry addition. Microprogram control concepts are analyzed by designing a stored logic microprogrammed control computer. CDL descriptions of fixed point and floating point arithmetic units are developed as well as memory addressing schemes, memory stacks, associative memory and virtual memory organizations. This design simulation technique enables the student to map any hardware scheme to software implementation to validate a design and reduce risks associated with new concepts. An attempt will be made to enable participants to gain access to computer terminals for hands-on experience, and the opportunity to solve participants' work-related problems using the CDL simulator.

Faculty: Mr. Paul Barr
Principal Engineer
Raytheon Company

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

5914 Digital Computer Input-Output Organizations and Interfaces

A systems study devoted to input-output organizations and interfaces. Basic philosophies of typical computer I-O designs are discovered through the analysis of some representative present-day computers. Interface requirements are derived from the functional descriptions of a computer I-O and several representative I-O devices. Synthesis of an I-O oriented computer is described.

Course Content Review of the general-purpose digital-computer organizations for programmed control, programmed data transfers, and automatic data transfers. Abstraction of I-O philosophies. Typical hardware interfaces and the elementary support software. Synthesis of a hypothetical digital-computer organization designed for I-O applications.

Faculty: Dr. Donald R. Haring
President
Computeck, Inc.

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning October 10, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5916 Advanced Computer Architecture

This course provides conceptual tools which enable the design engineer to structure several forms of modern computer organizations and to determine the optimum architecture using basic standard elements. It also examines variations permitted in the relationships between these elements.

The mathematics associated with this course deals only with the basic arithmetic algorithms needed for design implementation. A knowledge of Boolean algebra is assumed. If time allows, a complete computer system will be structured emphasizing every system decision.

Course Content Architectural approaches include: uniprocessing, multiprogramming, multiprocessing, federated systems, distributed fetch system, pipeline array processing.

For each of the above, the course covers the following topics: Fetch mechanisms: instruction formats, operation codes, indexing, indirect addresses, addressable instructions. Selection of instruction sets: fetch and loop control, test and branch, arithmetic, logical and transmission types. Execution mechanism: data formats, selection of number system, fixed point arithmetic, floating point arithmetic, complex arithmetic, matrix and vector arithmetic, polynomial generator, control sequences.

Faculty: Mr. Alan J. Deerfield
Consulting Scientist
Raytheon Company

Thursday evenings, 5:00 to 7:00, 14 sessions beginning February 20, 1975. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5919 Low-Cost Microprocessor Design and Applications

A microprocessor is a small processor, often available on a single IC chip or PC card. It can be reduced in cost by sacrificing unnecessary performance parameters such as speed of operation or parallel register structure. This course covers the relationship of the design of low-cost microprocessors to specific applications. Techniques are presented for applying microprogramming and ROMs to processor applications, and replacing classical control logic with instruction sequences. Fully developed cases, including the four-function calculator and intelligent CRT terminal, are used to illustrate the content.

Course Content Review of low-cost IC microprocessor designs. Microprocessor operation: I/O memory, arithmetic element, and control. Microprogramming processor instructions. ROM's for classical combinatorial and control logic. Microprocessor implementation of a four-function calculator. Expanding a four-function calculator to perform algebraic functions and to become a programmable calculator. Programming microprocessors. An intelligent CRT terminal design using a microprocessor to perform the functions of control logic and to provide computation power. Some novel microprocessor applications. The low cost microprocessor's future.

Faculty: Dr. Donald R. Haring
President
CompuTek, Inc.

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5920 Low-Cost Microprocessor Applications

This course is designed to follow Course 5919. It stresses the variety of applications possible with low-cost microprocessors. Several case histories are studied in depth from problem definition to problem solution. Several different microprocessors are used in the examples, with preference given to readily available devices.

Faculty: Dr. Donald R. Haring
President
CompuTek, Inc.

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5924 Survey of Small Computer Architecture

Through a cohesive series of presentations, this seminar series introduces the fundamentals of small computer architecture, including a study of low-cost microprocessor utilization. The fundamental design approach, architecture, and software operating systems for several popular minicomputers manufactured by Honeywell, Data General, and Digital Equipment Corporation are presented. Familiarity with computers and Boolean algebra is assumed.

Course Content Architectural approaches include: uniprocessing, multiprogramming, multiprocessing, federated systems, distributed fetch systems, pipeline array processing. For each of the above, the course covers 1)

fetch mechanisms: instruction formats, operation codes, indexing, indirect addresses, addressable instructions, 2) selection of instruction sets: fetch and loop control, test and branch, arithmetic, logical and transmission types, 3) execution mechanisms: data formats, selection of number system, fixed point arithmetic, and floating point arithmetic.

A review of microprocessor architecture includes: I/O memory, arithmetic element, and control. Included are discussions of microprogramming processor instructions, ROM's for classical combinatorial and control logic, and several novel microprocessor applications.

Faculty: Mr. C. Gordon Bell
Vice President of Engineering
Digital Equipment Corporation
Professor of Computer Science (on leave)
Carnegie-Mellon University

Mr. Alan J. Deerfield
Consulting Scientist
Raytheon Company

Dr. Donald R. Haring
President
Computek, Inc.

Mr. Gardner Hendrie
Manager of Systems Engineering
Data General Corporation

Dr. David L. Nelson, Course Coordinator
Manager of Programming, Special Systems
Digital Equipment Corporation

Mr. George J. Smith
Director of Engineering
Computer Engineering Operation
Honeywell Information Systems, Inc.

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5950 Fundamentals of Digital Signal Processing

The increasingly wider application of digital circuitry and new signal-processing techniques has changed the design methodology for communications transceivers and modems, vocoders, radars, sonars, and other real-time signal processors. These same new signal-processing techniques are also being used on general-purpose digital computers for engineering system simulation, and for spectral and statistical analysis of experimental data.

Central to these signal-processing techniques are the concepts of digital filtering, and the fast Fourier transform. In this course the major emphasis will be upon the application of discrete time methods to continuous-time processes. A familiarity with continuous-time signal and systems analysis constitutes the necessary background.

Course Content Properties of sampled signals and systems; quantization effects in A/D conversion. Digitalization of analog filters by ordinary and bilinear Z-transforms. Interpolation methods and D/A distortion. Introduction to the discrete Fourier transform and the FFT algorithm. Fast convolution and finite impulse response digital filters. Effects of finite word length.

Faculty: Dr. John J. O'Donnell
Senior Scientist
CNR, Incorporated

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5955 Advanced Concepts in Digital Signal Processing

The successful application of signal-adaptive techniques, and the rapid progress in charge-coupled device (CCD) fabrication provide two examples of recent extensions of discrete-time signal processing technology. This course provides a deeper understanding of digital filter and FFT techniques, assesses the impact of CCD's on signal processing implementation, introduces signal-adaptive processing methods. Familiarity with the fundamentals of digital signal processing is required.

Course Content Digital filters for smoothing and interpolation: infinite-impulse-response (IIR) and finite-impulse-response (FIR) designs. Mixed-radix, parallel, and pipeline FFT algorithms; properties of hardware and software FFT processors. FIR filter realization with CCD's; the chirp Z-transform and CCD realization of the discrete Fourier transform. Signal-adaptive techniques: system modeling and linear predictive coding using inverse filtering and Parcor algorithms; high-resolution spectral analysis. Ladder structures and wave digital filters. Introduction to multidimensional filters and transforms.

Faculty: Dr. John J. O'Donnell
Senior Scientist
CNR, Incorporated

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Unit.

5960 Data Acquisition Systems I (Formerly 5920)

The first of a two-semester course covering the problems and techniques involved with sensing analog situations, preconditioning, multiplexing, sampling, and quantizing data for digital storage or computer processing. Part one considers system and hardware concepts from the analog input through A/D conversion. Principles of sampling theory and data system parameters as they affect the sampled signals are discussed. The ability to specify equipment and understand existing specifications is developed.

Course Content Basic sampling theory, aliasing or frequency folding, time averaging, frequency resolution, aperture, accuracy, amplitude resolutions, monotonicity, differential and integral linearity, stability, differential and common mode noise, signal conditioning, analog multiplexing, and quantization. Scanners, multiplexers, transducers, data amplifiers, operational amplifiers and A/D converters. Emphasis is placed on the establishment of system requirements and their relation to equipment parameters.

Faculty: Mr. Arnold H. VanDoren
Manager, Computer Systems Department
Raytheon Company

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

5961 Data Acquisition Systems II (Formerly 5921)

Part two examines the many aspects of the digital side of the data acquisition system. After reviewing semester one, such topics as error analysis, D/A conversion, digital circuitry, timing and control, storage units, output devices, computers, and basics of system design are discussed. Emphasis is placed upon the role of minicomputers and microprocessors in data acquisition systems. The prospects of microprogramming a data logging system is considered. The establishment of system requirements and their relation to equipment parameters is discussed. Upon completing this course, participants are able to specify and design data acquisition systems.

Course Content Review of semester one, D/A converter types, ladder networks, multichannel D/As, error analysis, logic circuit types (TTL, ECL, MOS), logic symbology, SSI, MSI, LSI, timing and control, data formats, operating modes, data multiplexing, real time and time of day clocks, housekeeping characters, recording codes, storage units, teleprinters, paper tape punches and readers, magnetic tape units, card punches, line

printers, displays, minicomputers, microprocessors, software, system design concepts, flowcharting, functional logic development, and physical layouts.

Faculty: Mr. Arnold H. VanDoren
 Manager, Computer Systems Department
 Raytheon Company

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning February 18, 1975.
 Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

Note: Also see the following courses listed in the appropriate section:

- 1201 Modern Communications Systems Seminar
- 1204 Theory and Practice of Data Communication
- 1207 Theory of Synchronous Communications
- 1208 Synchronization and Coding
- 1240 Optical Fiber Communications Systems
- 1524 Radar Systems: Design and Applications
- 1528 Radar Processing and Automatic Detection
- 1704 Random Processes
- 1764 Electronic Component Engineering
- 1910 Pattern Recognition
- 2180 Illumination Engineering
- 2862 Laser Systems and Applications
- 3330 Materials and Processing Techniques for Hybrid Integrated
 Circuits
- 3351 The Growth and Characterization of Single Crystals
- 8315 Physiology and Biomedical Engineering

Mechanical Engineering

6010 Soldering and Brazing

This course, for engineers, technical managers, and quality control specialists, provides a comprehensive examination of these important materials joining processes. Theoretical considerations of joint design, surface physics, and alloy formation are followed by practical discussions of processes including heating, cleaning, testing, and detailed coverage of specific applications.

Course Content Theoretical background—surface physics: atomic structure, crystal lattices, surface energy, contact angle, spreading and wetting. Oxide formation and reduction. Alloys: phase diagrams, eutectics, intermetallic compounds, solid solutions, epitaxial systems. Production techniques—surface preparation. Positioning and alignment of joint members. Application of solder or filler metal. Heating methods: torch, furnaces, infrared, luminous wall, resistance, induction, electron beam, salt bath, dip and wave soldering. Control of temperature/time cycles. Postcleaning. Inspection and repair. Test procedures—evaluation of materials. Properties of completed joint: mechanical strength, resistance to temperature cycles in service, to vibration, corrosive atmospheres, irradiation. Applications—general industrial applications. Use of S & B in the electronic industry. Automated procedures. Brazing for vacuum systems. Refractory metals for high-temperature service. Ceramic-to-metal joints. General information—definition of terms. Guide to the literature. List of suppliers. Specifications. Solder compositions. Fluxes. Brazing filler metals.

Faculty: Dr. Walter H. Kohl
Consultant

Tuesday evenings, 7:15 to 9:15, 10 sessions, beginning October 8, 1974
Tuition: \$130, including instructional material. Location: Weston High School, Weston, Massachusetts. Two Continuing Education Units. Also tentatively offered in the spring.

6452 Noise and Vibration Control

The principles and practice of identifying and controlling vibration and noise are presented. The generation, propagation, measurement, and relationship between noise and vibration are examined. Sound fields in rooms and propagation outdoors are considered in addition to local and federal regulations, standards, and the effects of noise in the community.

Course Content Sound waves: generation, propagation, acoustic impedance, intensity, directivity, and correlation. Sound and vibration measurements: equipment, techniques, and data analysis. Analysis of vibrating bodies, transmission media, and sound and vibration transducers. Sound propagation in large and small rooms and outdoors. Acoustic properties of materials. Sources of sound. Noise and vibration reduction: mufflers, isolation systems, damping materials, and enclosures. Damage-risk criteria and community noise.

Faculty: Mr. George H. Ashley
Dr. John L. Butler, Course Coordinator
Senior Acoustical Engineers
Raytheon Company

Mr. Lewis H. Bell, Vice President
Mull, Bell and Associates

Mr. William J. Cavanaugh
Dr. Lawrence G. Copley
Consultants

Mr. Robert M. Hockheiser, Vice President, Marketing
Barry-Wright Corporation

Mr. Klaus Kleinschmidt
Cambridge Acoustical Associates

Tuesday evenings, 7:15 to 9:15, 15 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

6465 Nonlinear Vibrations

This tape-lecture series presented in cooperation with M.I.T.'s Center for Advanced Engineering Study discusses various methods—exact and approximate, numerical and graphical—of dealing with vibrations in systems described by nonlinear differential equations. A working knowledge of elementary calculus and Newton's Laws is assumed. Guest lecturers will cover selected application areas in addition to the video presentations developed by Dr. Jacob P. Den Hartog, Professor Emeritus of Mechanical Engineering at M.I.T.

Course Content Introduction. The phase-plan method, application of the phase-plan method, pendulum in a rotating plane. The Van der Pol equation, relaxation oscillations, periodic reversal of rotation of a D.C. motor. Forced undamped vibrator with nonlinear spring, piece-wise linear systems, forced vibrator with nonlinear damping, exact solutions. The Sommerfeld effect. Tuned centrifugal pendulum. Nonlinear centrifugal pendulum, solution and interpretation. Aircraft jet rotor with ball bearings with clearances. Method of Krylov-Bogoliubov, physical interpretation of the K & B formulas. Method of Galerkin, applications. Modified Martienssen method-subharmonic resonance.

Monday evenings, 5:00 to 7:00, 24 sessions, beginning October 7, 1974. Tuition: \$300, including texts, study guides, and notes. Location: Weston High School, Weston, Massachusetts. Make-up sessions are available at Weston High School. 4.8 Continuing Education Units.

6481 Failure Analysis

This course covers case histories of typical failures as well as work-related problems submitted by participants. Proper methods of conducting failure analyses and determining causes of failure are discussed. For each example of failure, corrective design changes and alternative manufacturing methods are explored. Supplementary lectures on selected topics deal with the practical and theoretical aspects of failure analysis.

Course Content Case histories illustrating the nature and causes of failures. Stress, corrosion, and stress-corrosion failures. High and low temperature failure. Control, alteration, and nature of surface properties. General procedures in service failure analysis. Cohesive strength. Fracture mechanics: ductile fracture, ductile-brittle fracture. Fracture toughness testing. Static and dynamic fatigue. Designing for fatigue. Fracture of metallic and non-metallic materials; fracture of composites. Assessing and designing for specific environments. Failure related to manufacturing processes. Visual and microscopic examination, chemical analysis, non-destructive testing, mechanical testing. Statistical concepts. Product liability.

Faculty: Dr. Bernard S. Lement
Consultant

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

6800 Vacuum Processes and Systems

Principles utilized in industrial and research-related vacuum systems are covered. The course describes characteristics of processes utilizing vacuum in the electronic, nuclear, metallurgical, and research fields; as well as the design concepts and functions of system components. Emphasis is on practical, realistic applications of vacuum equipment and techniques in industrial processes and research investigations. Upon completion, the participant is able to establish vacuum system requirements and relate them to equipment parameters for a specific application. This includes all general aspects of equipment design and component selection. Guest lecturers speak on various specialties, and a field trip is planned to view systems in operation.

Course Content General: chamber construction, closures and seals, vacuum pumping, vacuum gaging. Materials: ferrous metals, refractory metals, elastomers, ceramics, pump fluids. Components: vacuum pumps, seals, power supplies, instruments, gages, controls, heating elements, manipulators. Furnaces: resistance, induction, heat treating, annealing, sintering, quenching. Melters: arc, induction, levitation. Welders: T.I.G., E.B., plasma arc, hollow cathode, laser. Presses: compacting, diffusion bonding, powder metallurgy. Coaters: evaporation, sputtering. Environment: space simulation, glove box. Accessories: lifts, conveyors, positioners, wire feeders, optical viewers, feedthroughs. Topics are weighted to reflect class interest.

Faculty: to be announced.

Spring semester. 14 sessions. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

Note: Also see the following courses listed in the appropriate section:

1031	Professional Engineers License Exam Preparation: Mechanical Engineering I
1766	System and Design Practices in Maintainability
3102	Applications and Properties of Polymeric Materials
3220	Properties and Applications of Ceramics
3250	Powder Metallurgy: Applications and Techniques
7510	Project Administration
7570	Finance for Engineers
7635	Product Assurance
7640	Product Liability and Safety
8314	Physiology and Biomedical Engineering
9504	Industrial Air and Gas Cleaning
9560	Industrial Ventilation
9560	Modern Structural Steel Design

Industrial Engineering

7100 Operations Research

This course introduces operations research techniques and shows how to implement them in an industrial environment. Practical applications are considered to clearly delineate the quantitative advantages and problems associated with current techniques. A systematic survey of operations research methods, demonstrated by descriptive examples is provided. A review of available software packages and management resources is made. Participants should have some knowledge of probability or statistics; other pertinent techniques are developed in class.

Course Content Techniques discussed include: linear programming, dynamic programming, Bayesian analysis in management decision making, Markovian modeling, and model testing. Applications areas: material allocation, production and transportation scheduling, risk minimization, machine maintenance scheduling and profitability model testing.

Faculty: Mr. Stephen V. Tang
Chief, Personnel and Industrial Relations
Transmission Equipment Division
Western Electric Company

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning October 10, 1974
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

7470 Systems Analysis and Planning for Industrial Automation

This course is for professionals involved in the planning, analysis, and implementation of industrial automation systems and sub-systems. Emphasis is on practical methods for determining systems feasibility, design, and cost and developing a framework to document system information and process flow. Computer-based systems will receive major emphasis due to their current and projected importance in industrial automation.

Course Content Systems engineering and planning in industry, systems organization, and computer-based automation. Problem identification and system formulation. Determining system objectives. Feasibility studies. Functional analysis including development and use of flow charts. Data management. System controls. Determination of system value, costs, time, and reliability. System flexibility and evolution. Hardware and software requirements.

Faculty: Mr. Dominick J. Carlino
Senior Staff Member
Western Electric Company

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

522 Computers in the Manufacturing Environment

Increasing emphasis is being placed on using the computer to optimize the performance of a business enterprise. In comparison with procedurized accounting processes, manufacturing is highly individualized to the type of product, type of customer services offered, and controls required to minimize cost. This course shows how to attain effective computer control by properly interfacing the principal manufacturing functions—product engineering, manufacturing and process engineering, quality assurance, production control, the shops, and material management—with modern electronic data processing.

Course Content Description of typical organizational problems that inhibit optimization by computer control. The relationship of the major information subsystems to a total business enterprise and to each other. Examination of participants' firms. Information systems especially suitable for computerization are presented. Mathematical forecasting, order entry and processing, product information data bases (bills of materials, routing, etc.) inventory reporting and control, purchasing, production scheduling and loading, engineering project management applications, and related subjects of special interest.

Faculty: Mr. Kenneth H. Little
Senior Manufacturing Consultant
Honeywell Information Systems, Inc.

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

7523-7524 Work Factor Techniques I and II

Designed for industrial and manufacturing engineers, production managers, and work measurement analysts, this course enables the participants to establish standards for direct and indirect labor operations in both manufacturing and clerical settings. Methods used to scientifically measure manual and mental human work are presented with the aim of avoiding the inherent inconsistencies of stop-watch techniques. The application of ready work factor to labor standards, cost estimating, pricing, machine and part design, manpower determination, capacity determination, and production control are discussed. Numerous case studies will be used to illustrate key concepts. At the completion of this two-semester sequence, the participant will become eligible to take the Ready Work Factor Certification Exam.

Course Content History and theory of Work Factor. Principles of Ready Work Factor. The four major motion-time variables: body member, distance, weight or resistance, manual control. Recording motion analysis and time units. Tables for other standard elements of work: grasp, pre-position, assemble, release, mental process. Derivation of time values. Ready standard elements and work segments: transport, grasp, pick-up, preposition, assemble, use, disassemble, release, place aside, mental process, walk, apply pressure. Ready work analyses: recording work segment descriptions and motion analyses, ready analysis check by comparing with detailed analyses, examples and explanation of analyses. Work simplification, methods improvements, equipment justification, parts design, etc.

Faculty: Mr. Edwin H. Dineley
Manager of Manufacturing Services
Unitrode Corporation

Part I: Tuesday evenings; 7:15 to 9:15, 15 sessions, beginning October 8, 1974. Tuition: \$175, including instructional material. Location: Burlington Campus. Three Continuing Education Units.

Part II: Same as above. Begins February 18, 1975.

Note: Also see the following courses listed in the appropriate section:

- 1737 Industrial Application of Minicomputers
- 1738 Digital Computer Control
- 1766 System and Design Practices in Maintainability
- 2856 Noise Measurement and Control
- 3700 Introduction to Industrial Chemistry
- 5101 Introduction to Electricity, Circuits, and Machines I
- 6010 Soldering and Brazing

- 6800 Vacuum Processes and Systems
- 7615 Power Generating Plant Safety and Reliability
- 7635 Product Assurance
- 7640 Product Liability and Safety
- 9500 Air Pollution—Sources and Control
- 9549 Industrial Energy Management
- 9560 Industrial Ventilation

Engineering Management

7505 Law in Engineering Practice

Important legal concepts related to patents, copyrights, proprietary information, licensing, and product liability are discussed. Designed for engineers and technical managers, the course enables participants to recognize and prevent legal difficulties encountered in the conception, design, manufacture, technical description, and marketing of industrial products. Numerous examples taken from actual industrial practice are used to illustrate key concepts.

Course Content Patent law: constitutional authority for patents, subject matter of patentable inventions, requirements for patentability, the patent application, interference, record keeping, reissue, infringement, and validity. Copyright law: constitutional and statutory authority for copyrights, subject matter and statutory classes of copyrights, uncopyrightable material, rights secured by copyrights and how and by whom obtained, unpublished and published works, deposit requirements, ownership and transfer of copyrights, remedies for infringement, and taxation. Proprietary information: nature of proprietary information, employer-employee relationship, employee recruiting, remedies for wrongful use, dealing with outsiders, technical data exportation control, and the future of proprietary information. Assignments and licenses: general attributes, some illegal aspects, contents of the agreement, anti-trust law, misuse problems, and trends. Product liability: privity of contract, negligence and warranty theories, Uniform Commercial Code, strict products liability, design defects, standards, insurance protection, Consumer Products Safety Act and other legislation, and judicial trends.

Faculty: Mr. Bernard H. Lemlein
Attorney at Law

Monday evenings, 7:15 to 9:15, 10 sessions, beginning October 7, 1974. Tuition: \$130, including instructional material. Location: Weston High School, Weston, Massachusetts. Two Continuing Education Units.

7510 Project Administration

The first of two courses in project management and control, this segment surveys the tools available to improve control over aerospace, industrial, and construction projects. It is designed to benefit both those responsible for administrative project control functions and others interested in techniques used to bring administrative, scheduling, and financial problems into focus.

Course Content The nature of projects. Planning function: establishing objectives, setting priorities, master scheduling, PERT, CPM, line of balance techniques, locating potential trouble spots. Scheduling function: scheduling techniques, computer aids, level of detail, considerations of contracts, multiple projects, operations research techniques, monitoring and updating. Budgeting function: structuring, accountability, measuring performance, progress reports, highlighting, forecasting, effects of contract changes, and discussion of PERT/Cost. Performance evaluation. Packaged project management network oriented systems.

Faculty: Mr. Melvin B. Langbort
Consultant

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

7513 Project Financial Management

The techniques for financial management of aerospace, industrial, and construction projects are surveyed. The course is designed to benefit those responsible for project management functions and others who desire to learn the techniques used to bring financial problems into focus. Aspects of internal financial management decisions are also discussed. The teaching method includes lectures, case studies, and class discussion. No formal financial training is required.

Course Content Overview of project management and finance. General review of accounting and financial principles. Planning, estimating, and proposal preparation techniques. Budgeting techniques, overhead allocation. Cost accounting and the nature of costs. Review of contractual requirements and clauses affecting project financial management. Engineering/manufacturing interface and related financial management problems.

Faculty: Mr. Melvin B. Langbort
Consultant

Mr. Thomas N. Watson
Manager of Pricing and Venture Analysis
Sanders Associates

Monday evenings, 7:15 to 9:15, 14 sessions, beginning February 24, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

7570 Finance for Engineers

This course provides technical personnel with an appreciation and understanding of financial management. It is designed to eliminate confusion in financial terminology and develop an understanding of basic concepts as well as specific techniques in finance. Participants are encouraged to relate the financial function to their own specialty and to discuss the financial implications of their decisions. A working knowledge of accounting and finance is not required.

Course Content The finance function: what it does and where it fits. treasury vs. control, operating rules, (I.R.S., GAAP, SEC) financial statements: balance sheet, profit and loss statement, ratio analysis. Financial planning: sources and uses of funds, survey of cost accounting and cost behavior: standard costs, direct cost, fixed and variable cost, job and process costs. Survey of budgeting and profit planning. Breakeven analysis for decision making: product planning; pricing, equipment selection, marketing. Return on investment for decision making: methods of computation, usage in capital equipment evaluation, cost of capital concept, new product evaluations, inventory management, linear programming, risk analysis, business models. Sources of capital. General review and discussion.

Faculty: Mr. Melvin B. Langbort
Consultant

Mr. Thomas N. Watson
Manager of Pricing and Venture Analysis
Sanders Data Systems

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

7580 Trends and Concepts in Engineering Management

This course is for the manager, faced with the challenge of leading others in a technological environment, who desires to be more effective. The participant is acquainted with important management concepts, practices, and trends. A framework for meaningful discussion is provided, enabling participants to relate new management approaches to their work.

Course Content Scientific management, industrial human relations, bureaucracy, matrix organization, program management. Organizational effectiveness, development, and adaptation. The introduction of change into an engineering organization. Characteristics of professional people, hierarchy of needs, motivation. Managerial styles, delegation options, standards of performance, performance evaluation. Perception and its importance, managerial communications. Group dynamics and project teams. Managerial ethics. POSDCORB.

This workshop provides a unique opportunity for participants to interact in small groups with others from various company environments and encourages discussion and application of the course content. A text and course notes are provided and a special library of related books is available.

Faculty: Dr. Theodore F. Gautschi
 Director of Management and Organizational Development
 Mr. Lee E. Sheehan, Vice President
 Honeywell Information Systems, Inc.

Monday evenings, 6:00 to 9:00, 10 sessions, beginning October 7, 1974. Tuition: \$200, including instructional material and coffee break. Location: Henderson House, Weston, Massachusetts. Three Continuing Education Units.

7581 Modern Engineering Management

This course is for the person faced with the challenge of managing others in a technological environment who desires to be more effective. An in-depth study and application of significant concepts in engineering management is provided.

Following a brief survey of the engineering management field, concepts of leadership, coordination and control, communication, planning, and organizational dynamics are investigated in greater detail. These investigations relate current managerial theory and practice to the engineering environment in the seventies.

Course Content New patterns in organization design such as the matrix organization. Various planning and control concepts and techniques:

five-year planning, tradeoff analysis, establishing organizational goals, integrating advanced technology, and the planning cycle. Identifying communication barriers and gateways; achieving organizational commitments; and exploring leadership styles. This is an opportunity to interact in small groups with others from different environments.

Faculty: Dr. Theodore F. Gautschi
 Director of Management and Organizational Development
 Honeywell Information Systems, Inc.

Monday evenings, 6:00 to 9:00, 10 sessions, beginning February 24, 1975.
 Tuition: \$200, including instructional material and coffee break. Location:
 Henderson House, Weston, Massachusetts. Three Continuing Education
 Units.

7582 Advanced Engineering Management Workshop

This program explores current issues confronting the engineering manager in today's dynamic business environment. Primarily for those in middle and upper engineering management, it provides guidelines to help in decision-making activities. Using a problem centered approach, these workshops provide opportunities for participants to interact in small groups with others from various company environments who are faced with the same problems. The workshop faculty includes specialists in the various areas who operate as resource people to assure that the topics are explored in a comprehensive manner. Copies of significant literature are provided.

Course Content The dynamic business environment, product planning and implementation, the changing work force, equal employment opportunity and affirmative action programs, professional development. Metrification, occupational and product safety requirements, management information systems, program management in a multi-project environment, new technology forecasting, financial controls.

Faculty: Prof. Donald D. French
 Director, State-of-the Arts Program
 Northeastern University
 Dr. Theodore F. Gautschi
 Director of Management and Organizational Development
 Mr. Jerome Kanter
 Director, Medium Systems Product Line
 Honeywell Information Systems, Inc.
 Mr. Warren E. Norquist
 Director of Reliability
 Polaroid Corporation

Tuesday evenings, 6:00 to 9:00, 10 sessions, beginning October 8, 1974. Tuition: \$225, including instructional material and coffee break. Location: Henderson House, Weston, Massachusetts. Three Continuing Education Units.

7615 Power Generating Plant Safety and Reliability

A treatment of the design and operation of fossil and nuclear-fueled power generating plants with emphasis on achieving failure-free and accident-free performance. The course includes the principles of reliability and maintainability applied to plant protective systems. Corrective and preventive maintenance considerations are covered with a view toward attaining high equipment availability and minimal outages. Establishment of decision criteria for maintenance crew size and skills, overhaul periods, and checkout test intervals. Redundant protection and system safety techniques are developed and applied to work-related problems submitted by participants.

Course Content Fundamentals of probability and statistics applied to systems consisting of power plant and ancillary equipment. Definition of system and subsystem failures, reliability modeling of plants, and prediction of system longevity. Plant design trade-offs and economics. Data sources and collection systems. System and subsystem specifications. Fault-free construction and failure modes and effects analysis (FMEA).

Faculty: Mr. Avery H. Hevesh
Principal Engineer
Raytheon Company

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning February 18, 1975. Tuition: \$175, including instructional material. Location: Boston Campus. Three Continuing Education Units.

7635 Product Assurance

Participants are provided with the underlying principles and techniques required to implement modern product assurance programs. Embracing the fields of reliability, maintainability, quality control, product test, and product evaluation, the course offers an exposure to the latest, proven approaches employed by industry for assuring high product reliability and quality at a reasonable cost. A broad treatment of the methods used for detection, correction, and avoidance of design and production deficiencies is offered. The course material extends to all phases of industrial operations from research and development through large-scale manufacturing activities. A

familiarity with basic probability and statistics is a desirable prerequisite. Technical treatment of the material is balanced by discussions of actual cases.

Course Content Definition and measurement of product merit. Planning and developing programs for high quality and reliability in military as well as commercial product lines. Applications of statistics and inference in evaluating product acceptability. Uses of probability in predicting product life expectancy. A study of the organization required to achieve a sound product assurance program aimed at both the prevention and correction of product deficiencies. Roles played by specialists in design review, failure analysis, failure reporting, and corrective action. Test planning and sampling approaches producing high data yields at moderate cost.

Faculty: Mr. Avery H. Hevesh
Principal Engineer
Raytheon Company

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 8, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

7640 Product Liability and Safety

This course covers principles and techniques involved in the selection, evaluation, and control of product liability exposures for manufacturers, distributors, and service organizations. It is designed for safety, production, design, service, and quality control engineers, and management personnel who have, or may be charged with, responsibilities related to the control of product liability exposures. The overall emphasis is on incorporating into working methods and procedures appropriate consideration of potential loss factors in addition to the functional factors normally given careful, competent consideration. Guest lecturers present selected topics.

Course Content Development of liability: basic causes of action. How liability arises: schematics, flow diagrams. Warranties: express, implied, what they are, impacts, trends. Product liability control measures: learning to detect hazards, how to evaluate and control. Impact of Consumer Product Safety Act and the Occupational Safety and Health Act: laws, standards—What's reasonable? Hazard index. Plaintiff's checklist. Warnings: guiding principles, labels. Guideline principles. Product safety vs. product liability. Summaries of actual cases; lessons to be learned. Role of the insurance company: insurance per se, loss control service. Systems safety analyses. Record-keeping: logs, notations, duration, traps. Testing: in plant, independent labs, approving agencies, needs, types.

Faculty: Mr. Richard E. Schroeder
Director, Engineering Services
American Mutual Insurance Company

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

Note: Also see the following courses listed in the appropriate section:

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|------|---|
| 4106 | Applied Statistics |
| 4125 | Introduction to Experimentation |
| 7100 | Operations Research |
| 7550 | Advanced Management Workshop |
| 7553 | Long-Range Planning and Control |
| 7555 | Simulation—Modeling for Planning and Control |
| 7558 | Business Law and the Technological Organization |
| 7562 | The Marketing and Development of New Products |
| 9549 | Industrial Energy Management |

Advanced Management Workshops

7550 Advanced Management Workshop

This program is designed to increase the effectiveness of managers, and to enable them to better assess and utilize significant opportunities for their personal and organizational goals. The workshops focus on current practices that assist the manager in coping with the complexities of business and industrial change. The program is ideally suited for experienced middle managers preparing for advancement. Small business executives who have not had the opportunity to participate in a large corporation management staff should benefit materially from participation.

Course Content Setting organizational goals: strategic, long-range, and operational. Planning for stability and growth. Organization: functional, product line, centralized, decentralized, program management. Profit maximization and financial control systems: performance measurement, investment and profit centers, constraints and alternatives. Operating under adverse business conditions. Strategy for capturing new business. New ventures: mergers and acquisitions. Military and commercial planning and marketing, new products, licensing, product life cycles, competition analysis, technological and product forecasting. These workshops provide opportunities for participants to interact in small groups with others from various company environments and encourage discussion and application of the course content. Copies of significant literature are provided and a special library of related books are available. Enrollment is limited to 15 participants.

Faculty: Mr. Edward L. Dashefsky
Senior Vice President
Raytheon Company

Tuesday evenings, 6:00 to 9:00, 6 sessions, beginning April 8, 1975. Tuition: \$150, including instructional material and coffee break. Location: Henderson House, Weston, Massachusetts. Two Continuing Education Units. A biographical sketch or resumé must accompany the registration application.

7553 Long-Range Planning Seminar

This seminar focuses on the emergence of long-range planning as a formal management tool for the promotion of corporate growth and diversification. The program is designed to provide functional management and line operating personnel with an understanding of planning methodology and techniques enabling them to effectively contribute to the planning process.

Steps in the planning cycle, starting with setting of clear, concise corporate objectives and proceeding through the strategic and tactical plans necessary to meet those objectives are covered; including the functional interactions required within an operating entity for the effective generation of plans. Acquisitions and new product development as a means for growth are discussed within the context of the planning cycle. Particular emphasis is placed on the market research inputs required for planning and the generation of parallel, but supportive financial plans. The use of interactive planning models as a rapid means of evaluating different strategic plans is examined.

Faculty: Mr. William C. Holden
Vice President Corporate Development
Damon Corporation

Mr. Philip F. Paul
Director of Market Planning
Honeywell Information Systems, Inc.

Mr. Robert L. Seaman
Vice President of Planning
Raytheon Company

Mr. Thomas N. Watson, Course Coordinator
Manager, Venture Analysis and Pricing
Sanders Data Systems

Monday evenings, 7:15 to 9:15, 10 sessions, beginning October 7, 1974.
Tuition: \$150, including instructional material. Location: Weston High School, Weston, Massachusetts. Two Continuing Education Units.

7555 Simulation Modeling for Planning and Control

Today's business complexities are causing managers to devote more time to problems of materials shortages, pricing, regulation, environmental protection, social causes, and international competition. Moreover, domestic competition is becoming more sophisticated and intensive as the American economy matures. To help meet the need for more effective decision-making, simulation modeling has achieved widespread interest and management support because of its ability to offer controlled solutions to a wide

variety of alternative policies and practices. Fortunately, computer technology has advanced to the point where a relatively inexpensive system is adequate to support the demanding computational requirements of the modeling process. This course provides both the understanding of and the ability to gain experience in simulation modeling of business enterprises. Participants are enabled to develop and operate a model of their organization or parts thereof, and will be able to evaluate the probable effects of alternatives available to the firm. The course is designed for executives and staff specialists who will design, use, or operate simulation models. Familiarity with the concepts of strategic and operational planning is assumed.

Course Content Overview of modeling and simulation. A non-technical discussion of computer equipment capabilities and the use of on-line computer terminals. Introduction to simple arithmetic relationships and the development of equation formats for modeling. The development of mathematical models that simulate profit and loss statements, business balance sheets, and cash flow statements. The concept of integrated hierarchy models and systematic verification of organizational interrelationships. Equation changes for improving realism. A review of planning processes and their relationship to modeling. Non-financial models. Detailed case studies where sample models are built and tested in class.

Faculty: Mr. Robert L. Seaman
Vice President-Planning
Raytheon Company

Monday evenings, 6:00 to 9:00, 6 sessions, beginning April 7, 1975. Tuition: \$150, including instructional material and coffee break. Location: Henderso House, Weston, Massachusetts. Two Continuing Education Units.

7558 Business Law and the Technological Organization

This course, for middle and upper level managers of industrial companies, is designed to improve their understanding of legal principles applicable to the procurement and performance of government and commercial contracts. Participation in the course provides an increased awareness and understanding of an organization's legal functions, the advantages of an early recognition of potential legal problems, and the importance of the team approach in preventing and solving legal difficulties.

Course Content Foreign and domestic sales and leases: methods of distribution, sale vs. lease, negotiation of the contract, maintenance and servicing. Contracting with the U.S. and foreign governments: methods of procurement, precontract planning, preparation of the proposal, protests of procurement awards, types of contracts, key clauses, performance risks,

rights and duties of the government, the prime contractor and subcontractors, litigation and arbitration. Government regulation of business—an overview: antitrust laws, socioeconomic statutes, profit limitation statutes. Preventative law in conducting business. Title retention devices in credit risk sales or purchases: secured transactions under the uniform commercial code, other security devices, the insolvent supplier. Acquisitions—legal aspects of acquiring a company or product line.

Faculty: Mr. John M. Geaghan
Assistant General Counsel
Raytheon Company

Thursday evenings, 6:00 to 9:00, 10 sessions, beginning October 10, 1974. Tuition: \$225, including instructional material and coffee break. Location: Henderson House, Weston, Massachusetts. Three Continuing Education Units.

7562 The Marketing and Development of New Products

This series of workshops focuses on the trends and concepts of new product planning, development, evaluation, and marketing. The program is designed to enhance a manager's ability to establish, evaluate, or improve new product development and marketing programs within his organization. The workshop faculty includes executives from a broad spectrum of industrial functions and provides a comprehensive treatment of the practices required to bring a new product to market.

Course Content Strategic planning: setting objectives, corporate vs. divisional planning, tie-in to product and functional planning. The marketing functions: marketing organizations, marketing planning, marketing research, sales forecasting, competitive analysis, product life cycle. Product planning and implementation: idea generation and screening, patent considerations, product team concept, business plan, alternative strategies, implementation steps, and follow-up. Product research and development: technological forecasting, resource allocation. Product manufacture: resources required, impact on current factory load, make vs. buy, quality plan, life cycle costing. Product pricing and contractual arrangement: methods, considerations. Product promotion: advertising, test marketing. Product service: organizations, warranties, service contracts. Financial analysis: return on investment criteria and methods, cash flow, impact on overall near- and long-term business plans. Legal considerations: protection of proprietary products and processes, marketing policies, differences in government vs. commercial requirements, anti-trust.

- Faculty: Mr. George J. Butorac
 Manager of Marketing and Planning
 Bedford Laboratories, Missile Systems Division
- Mr. John M. Geaghan
 Assistant General Counsel
- Mr. William J. O'Halloran
 Production Manager
 Industrial Components Operation
- Mr. Robert L. Seaman
 Vice President of Planning
Raytheon Company
- Mr. Richard J. Flynn
 Director of Financial Planning and Analysis
- Dr. Theodore F. Gautschi,
 Director of Planning & Coordination
- Mr. Philip F. Paul
 Director of Product Planning
Honeywell Information Systems, Inc.
- Dr. James N. Little
 Vice President of Sales
 Waters Associates
- Mr. Theodore N. Voss
 Vice President of Advertising
 Polaroid Corporation
- Mr. Thomas N. Watson
 Manager, Venture Analysis & Pricing
 Sanders Data Systems

Monday evenings, 6:00 to 9:00, 10 sessions, beginning October 7, 1974.
 Tuition: \$250, including instructional material and coffee break. Location:
 Henderson House, Weston, Massachusetts. Three Continuing Education
 Units.

Note: Also see the following courses listed in the appropriate section:

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|------|--|
| 7582 | Advanced Engineering Management Workshop |
| 7640 | Product Liability and Safety |
| 9549 | Industrial Energy Management |

Food Technology and Management

8210 Food Quality in Food Service

This course presents the underlying principles of food processing as they relate to food quality. Topics include: basic chemistry of foods, food processing and rapid handling techniques, fundamentals of food microbiology, causes and epidemiology of food poisoning and packaging. In each case characteristics specifically related to food quality are stressed, and the essentials necessary for insurance of quality in rapid, convenience-oriented, mass-produced food are pointed out. Illustrative cases are discussed along with work-related problems of participants.

Course Content Overall picture of food service industry and general aspects of food preservation. Food chemistry. Nutrient retention during processing. Rapid handling of foods. Food microbiology. Food and drug laws. Food poisoning. Food processing technology for convenience foods. Problems in quality control in food service. Packaging aspects. Overall view of processing for quality. Problems in the food service industry from a management point of view. Outline and review of development of foods for a specific food service, and discussion of work-related problems.

Faculty: Dr. Anthony J. Sinskey
Associate Professor of Food Microbiology
Massachusetts Institute of Technology

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 15, 1974. Tuition: \$175, including instructional material. Location: Boston Campus. Three Continuing Education Units. Approved for 28 clock hours by the American Dietetic Association.

8235 Administration for Dietitians

This course for professional dietitians is designed to enhance their capacity to cope creatively and effectively with the variety of administrative problems which confront the dietitian as a manager. Emphasis is placed on the de-

velopment of the skills to analyze and understand the dynamics of organizational operations. The nature of the supervisor-subordinate relationship is explored as it affects individuals and the organization. In addition, participants are provided with the latest information in the areas of fiscal management, labor relations, electronic data processing, and safety management.

Course Content Organizational principles: structure and function. Leadership: styles, dynamics and problems. The supervisory relationship: dimensions and management factors. Communication in the organization: interpersonal and administrative. Understanding, building and maintaining morale. Planning, delegation, and decision making in administrative operations. Performance monitoring and evaluation. Financial management of food service operations: program budgeting, cost analysis and reduction. Overview of computer utilization. Labor-management relations, union negotiations, grievances. Safety management, OSHA, accident and loss prevention.

Faculty: Dr. Joseph L. Balintfy
Professor of Business Administration and
Operations Research
University of Massachusetts

Mr. Paul M. Colson
Safety Consultant

Dr. George J. Goldin
Professor of Rehabilitation and Special Education
Northeastern University

Mr. J. Lawrence Jeffrey
Director of Food Service
Brandeis University

Wednesday evenings, 5:10 to 7:10, 12 sessions, beginning February 19, 1975
Tuition: \$150, including instructional material. Location: Boston Campus. 2.4 Continuing Education Units. Approved by the American Dietetic Association for 24 clock hours.

8238 Food Service Operations Management

For experienced food service managers and supervisors, this course applies general management techniques to food service operations. The focus is on current practices that assist the manager to cope with the complexities of change in today's business environment. Principles of operational analysis are discussed to enable participants to assess their organization's strengths and weaknesses. Topics reflect class interests.

Course Content Market determination and merchandising for customer acceptance. Cost analysis, reduction, and control. Budget and financial planning. Formulation of operating procedures, staffing, and food production management. Purchasing. Cash and security controls. Development of personnel and operations performance appraisals.

Faculty: Mr. J. Lawrence Jeffrey
 Director of Food Service
 Brandeis University

Tuesday evenings, 5:10 to 7:10, 10 sessions, beginning October 15, 1974.
 Tuition: \$150, including instructional material. Location: Boston Campus.
 Two Continuing Education Units. Approved by the American Dietetic Association for 20 clock hours. Also tentatively offered in the spring.

Note: Also see the following courses listed in the appropriate section:

- 8254 Nutrition and Patient Care
- 8290 Computer Applications in Nutrition
- 8400 Health Professionals as Consultants
- 8450 Nutrition in Community Health
- 8500 The Geriatric Patient
- 9540 OSHA Compliance
- 9580 Industrial Toxicology and Product Safety Evaluation

Biomedical Science

8230 The Psychodynamics of Patient Care

This workshop, for health professionals, is designed to enhance their capacity to serve patients in a more complete way. It provides opportunities for members of the various health professions to interact and exchange experiences with patient care. The program enables participants to: assess the psychosocial needs of patients, improve their counseling skills, develop greater awareness of patient-staff interaction, appreciate the behavioral dynamics of handicap and illness, and understand the functions and problems of the health care team.

Course Content The dynamics of personality: psycho-social needs, temperamental differences, motivation and conflict, personality interactions. Behavioral dynamics of illness: influence of cultural values, unconscious factors, coping with overdependence. Counseling techniques: establishment of the counseling relationship, counseling styles, psychodynamic procedures, managing psychological defense mechanisms, evaluating counseling depth levels, self-awareness in counseling. The team approach to health care.

Faculty: Dr. George J. Goldin
Professor of Rehabilitation and Special Education
Northeastern University

Tuesday evenings, 5:30 to 8:00, 8 sessions, beginning October 15, 1974
Tuition: \$120, including instructional material. Location: Boston Campus
Two Continuing Education Units. Approved by the American Dietetic Association for 20 clock hours.

8252 Nutrition and Intermediate Metabolism

This course is designed for nutritionists, dietitians, and students of biology at a post-graduate level. It encompasses a review of energy requirements, expenditure, storage, and balance in the human being. The basic physiological and biochemical phenomena involved in the absorption, utilization, and transformation of the principal nutrients are discussed. Dietary, hormonal, and environmental factors that influence the utilization of nutrients are reviewed. The class, limited to 15 students, is conducted in an informal

seminar/workshop format. Active student participation is expected. Familiarity with basic nutrition, mammalian physiology, and elementary organic chemistry is desirable. Participants will gain an understanding of nutritional physiology and biochemistry useful in the rational design of normal and therapeutic diets.

Course Content Discussions and overview of energy metabolism: caloric requirement and expenditure; energy transformation in the mammalian organism; the absorption, utilization and metabolism of fats, proteins and carbohydrates; the utilization of biologic fuels following feeding and during fasting; the role of adipose tissue as an energy storage depot; the role of the liver and muscle in intermediary metabolism; the application of the above concepts to the dietary management of atherosclerosis, obesity, and diabetes.

Faculty: Dr. Robert J. Nicolosi
 Research Associate in Nutrition
 Dr. Harry Antoniadis
 Associate Professor of Biological Chemistry
 Dr. M. Guillermo Herrera
 Associate Professor of Medicine
 All of Harvard School of Public Health

Thursday evenings, 5:10 to 7:10, 14 sessions, beginning October 17, 1974. Tuition: \$175, including instructional material. Location: Boston Campus. Three Continuing Education Units. Application has been made for 28 ADA clock hours.

8254 Nutrition and Patient Care

Underlying principles of digestion, absorption, utilization and excretion of nutrients in normal and modified states of the human body are presented. Current theory and practices in therapeutic nutrition are covered. Case studies of patients with typical conditions are used to illustrate key concepts. Participants will have the opportunity to present work-related cases. The course, for nurses, physical and occupational therapists, and other health professionals, enhances their understanding of nutrition and its impact on patient care. A familiarity with general chemistry, anatomy, physiology, and medical terminology is assumed.

Course Content Protein, carbohydrate, lipids, vitamins, and minerals. For each nutrient a brief review of its normal metabolism and results of impaired digestion, absorption, utilization, or excretion is discussed. Case studies of patients on diets for protein modifications, fat restriction, weight control, Diabetes Mellitus, Hyperlipoproteinemia, sodium restriction, and Hypoglycemia.

Faculty: Ms. Lyn Fleming, Chairman, Nutrition
 Massachusetts General Hospital School of Nursing
 Lecturer, University of Vermont

Thursday evenings, 5:10 to 7:10, 10 sessions, beginning October 17, 1974.
 Tuition: \$130, including instructional material. Location: Boston Campus.
 Two Continuing Education Units. Also tentatively offered in the spring.

8256 Protein Regulation in the Hospitalized Patient

Protein-calorie malnutrition is the major nutrition problem in our hospitals today. This course discusses protein metabolism mechanisms and the development of negative caloric balance in the diseased patient. The role of adaptation to starvation in the conservation of body protein is examined. The course covers body composition, protein requirements in disease, intermediate energy metabolism, physiology of starvation, controlling factors in protein utilization, new products, and therapy in preservation and restoration of body cell mass. Specific attention is given to oral, elemental, and parenteral hyperalimentation practice. Special disease processes including renal failure, hepatic failure, cardiac failure, diabetes mellitus, sepsis, and trauma are discussed. The interdisciplinary approach to the care of the critically ill patient to optimize recovery is described.

Course Content Body composition: protein mass, fat mass, extracellular tissue fluid, skeleton. Intermediate energy metabolism: carbohydrate metabolism, protein metabolism, fat metabolism, hormone regulation. Physiology of starvation: ketone metabolism, protein-sparing, amino-acid metabolism. Nutrition: elemental diets, hyperalimentation. Nutritional support and clinical management of: liver failure, renal failure, cardiac failure, diabetes mellitus, sepsis, and trauma.

Faculty: Dr. George L. Blackburn
 Assistant Professor of Surgery
 Harvard Medical School,
 Senior Research Associate
 Massachusetts Institute of Technology,
 Director of Alimentation Service
 New England Deaconess Hospital and
 Boston City Hospital

Guest

Lecturers: Dr. Bruce R. Bistrian
 Research Associate
 Dr. Vernon R. Young
 Associate Professor of Nutritional Biochemistry
 Massachusetts Institute of Technology

Dr. Jean-Pierre Flatt
 Professor of Biochemistry
 University of Massachusetts School of Medicine

Dr. Joseph J. Vitale
 Professor of Nutritional Pathology
 Boston University School of Medicine

Monday evenings, 5:10 to 7:10, 12 sessions, beginning October 21, 1974.
 Tuition: \$150, including instructional material. Location: Boston Campus. 2.4
 Continuing Education Units. Application has been made for 24 ADA clock
 hours.

8260 Principles of Pharmacology

The health professional is provided with pharmacological and patho-physiological concepts governing the therapeutic use of drugs. This course enables participants to contribute more actively in patient care, and thoroughly reviews basic physiology. It describes: drug actions, the metabolism of major nutrients, and the effects of major hormones and enzymes. For each drug family considered, the effects on the patient's physiology and nutritional status is covered.

Course Content Review of physiology, nutrient metabolism, enzymes, and hormones. Effects of the following drug families: Acidifiers and alkalizers, analgesics, antibiotics, anticoagulants, antidepressants, antidiabetics, anti-hypertensives, barbiturates, diuretics, hormones, muscle relaxants, sympathomimetics, tranquilizers, uricosuric agents, anti-metabolites, chemotherapeutics, steroid, drug incompatibilities, adverse drug reactions, mind altering drugs, and drug addiction.

Faculty:

Dr. Jerrold G. Bernstein
 Assistant Medical Director
 Human Resource Institute of Boston
 Assistant Clinical Professor
 of Psychiatry
 Harvard Medical School

Dr. S. Edwin Fineberg
 Assistant Professor of Medicine
 Boston University School
 of Medicine

Program Director, Clinical
 Research Center
 Boston City Hospital

Dr. David J. Greenblatt
 Assistant Professor of Medicine
 (Clinical Pharmacology)
 Harvard Medical School
 Massachusetts General Hospital

Dr. Robert D. Rosenberg
 Assistant Professor of Medicine
 Harvard Medical School
 Beth Israel Hospital

Dr. Victor M. Rosenoer
Staff Physician and Head,
Gastro-Intestinal
Research Unit
Lahey Clinic Foundation
Lecturer in Medicine
Harvard Medical School

Thursday evenings, 6:10 to 8:10, 15 sessions, beginning October 17, 1974.
Tuition: \$175, including instructional material. Location: Boston Campus.
Three Continuing Education Units. Approved by American Dietetic Association for 30 clock hours.

8264 Fluid & Electrolyte Balance

This course provides the allied health professional with the underlying principles of the physiology, metabolism, and pathology of fluid, electrolyte, and acid-base balance. The oral and intravenous management of fluid, electrolyte, and acid-base disorders are covered. A background in general chemistry, biology, and elementary algebra is assumed. Familiarity with physiology is desirable, but not required.

Course Content Sodium, potassium, chloride, phosphate, and bicarbonate ion metabolism; buffering and acid-base balance; water metabolism; pathological states, including hyponatremia, uremia, dehydration, volume depletion, acidosis and alkalosis.

Faculty: Dr. Howard L. Bleich
Associate Professor of Medicine
Harvard Medical School
Beth Israel Hospital

Wednesday evenings, 6:10 to 8:10, 5 sessions, beginning October 16, 1974.
Tuition: \$70, including instructional material. One Continuing Education Unit. Location: Boston Campus. Approved by the American Dietetic Association for 10 clock hours. Registration must be accompanied by payment.

8290 Computer Applications in Nutrition

Many institutions considering or presently using computers do so with goals of improved patient care and efficiency of total operation. This course enables the participant to evaluate and improve existing practice in dietary programs through computer use. The course emphasizes the

application of computer technology to nutrition counseling, nutrition research, and food service operations, and includes lectures, discussions, and demonstrations of computers in a hospital environment.

The course is designed for practicing dietitians and nutritionists familiar with menu planning, nutrients in foods, food tables, diet histories, and food service operations in institutions. Enrollment is limited to fifteen.

Course Content Planning for computer use: systems analysis, flow charts. Preparation of data base: current status of food composition tables. Evaluation of dietary adequacy and food patterns: data gathering, coding methods, storage and retrieval functions, planned analysis of data. Metabolic diet management: construction of programs, analysis of results. Nutrition counseling in clinical practice: personalized dietary programs, diet histories, menu making. Food service operations: menu preparation, inventory control, records, recipe construction and analysis.

Faculty: Dr. Joseph L. Balintfy
Professor of Management Science and Operations Research
University of Massachusetts

Dr. Warner V. Slack
Assistant Professor of Medicine
Harvard Medical School
Beth Israel Hospital

Ms. Jelia C. Witschi
Assistant in Nutrition
Harvard School of Public Health
Course Coordinator

Thursday evenings, 5:00 to 7:00, 14 sessions, beginning February 20, 1975. Tuition: \$175, including instructional material. Three Continuing Education Units. Location: Boston Campus. Approved by the American Dietetic Association for 28 clock hours.

3318 Anatomy and Physiology

This is a course in applied anatomy and physiology for allied health professionals. The normal structure and function of the body is reviewed. The effect of disease on the structure and function of specific organ systems is presented. The significance of these disorders with regard to patient management is considered. Topics include the cardiovascular, respiratory, gastro-intestinal, genital-urinary, neurological, and skeletal systems. The course is tentatively scheduled for presentation at the Boston Campus during the spring of 1975. When available, complete information will be mailed to those who indicate interest by returning the reply card from the back of the catalog.

8360 Drugs in Psychiatry

This course discusses the important organic, physiological, and pharmacological concepts related to the causation and treatment of mental illness. The program focusses on the effects and side effects of drugs used in psychiatry. Numerous examples taken from clinical practice are used to illustrate the course content. Participants will have opportunities to present and discuss their own work-related cases. This course is designed for practicing psychiatric nurses and social workers, occupational therapists, psychologists, and others who work with psychiatric patients.

Course Content Chemical and physiological aspects of nervous system function. Chemical theories in the causation of psychotic illnesses. Clinical and pharmacological effects of drugs in psychiatric illness. Side effects encountered in the clinical use of psychotropic drugs. Special problems encountered with the use of psychotropic drugs in mental patients. Drug abuse and drug addiction: clinical problems and treatment approaches.

Faculty: Dr. Jerrold G. Bernstein
Assistant Medical Director
Human Resource Institute of Boston,
Assistant Clinical Professor of Psychiatry
Harvard Medical School

Monday evenings, 6:10 to 8:10, 5 sessions, beginning October 21 1974

Tuition: \$65, including instructional materials. Location: Boston Campus.

Registration must be accompanied by payment. One Continuing Education Unit.

8400 Health Professionals as Consultants

This course, for experienced health professionals, discusses the purpose function, and roles involved in the consultation process. The objectives are: to develop understanding and skill in problem-solving processes and apply these techniques to work-related cases; to develop self-awareness as a consultant; and to enhance consulting abilities through skill-building exercises. Readings and theoretical inputs from the instructor are combined with active involvement on the part of participants.

Course Content Determining need for consultation, contracts and fees consultant-consultee relationship. Problem solving steps and techniques ethics and values in consultation, the importance of feedback and personal style. The consultant as teacher, clarifier, resource person, change agent sounding board, problem solver, and support system. Roles of inhouse and outside consultants as well as consultees. Exercises for determining self awareness as a consultant and enhancing consulting abilities.

Faculty: Ms. Edna-Ann Katz
 Adjunct Associate Professor
 School of Social Work
 Boston University

Tuesday evenings, 7:00 to 9:00, 8 sessions, beginning October 8, 1974.
 Tuition: \$100, including instructional material. Location: Boston Campus. 1.6 Continuing Education Units. Application has been made for 16 ADA clock hours. Also tentatively offered in the spring.

8450 Nutrition in Community Health

This seminar presents an overview of federal and state programs for providing community health care. Recent legislation establishing and regulating day care centers, the elderly nutrition program, delivered meals, health maintenance organizations, and home health agencies are discussed. Program financing is also covered. The course is tentatively scheduled for presentation at the Boston Campus during the spring of 1975. When available, complete information will be mailed to those who indicate interest by returning the reply card from the back of the catalog.

8500 The Geriatric Patient

This course discusses the multi-faceted complexities of geriatric patient care. Psycho-social and economic factors are considered with emphasis on intellectual, cognitive and emotional functioning. Crucial issues including death, grief, chronic physical disease, mental disorders, and the role of the family are examined. The course is tentatively scheduled for presentation at the Boston Campus during the spring of 1975. When available, complete information will be mailed to those who indicate interest by returning the reply card from the back of the catalog.

Note: Also see the following courses listed in the appropriate section:

- | | |
|------|---|
| 4215 | Introduction to Experimentation |
| 8314 | Physiology and Biomedical Engineering |
| 8406 | Physiological Optics and Eye Protection |
| 9557 | Medical Radiation Protection |
| 9571 | Occupational Medicine |
| 9580 | Industrial Toxicology and Product Safety Evaluation |

Biomedical Engineering

8314 Physiology and Biomedical Engineering

The participant is introduced to the structure and function of the human organism and to biomedical systems currently used in hospitals. Approximately half the course consists of laboratory sessions related to blood component measurements and separation, blood flow, the heart and cardiovascular system, the kidney and urinary system, and respiratory system measurements. The remainder of the course includes site visits to major teaching hospitals and guest lectures on biomedical engineering.

Faculty:

Dr. Samuel Fine,
Course Coordinator
Chairman, Department of Biophysics
and Biomedical Engineering
Northeastern University

Dr. Saul Aronow
Principal Associate in Radiology
Massachusetts General Hospital
Harvard Medical School

Dr. Herbert Berman
Professor of Biology
Boston University

Dr. Paul Hill
Catheterization Lab Marketing
Specialist
Hewlett-Packard Corporation

Mr. Louis Kopito
Director of Spectro-Chemical
Research Laboratories
Childrens Hospital Medical Center
Harvard Medical School

Dr. Arthur Miller
Consultant

Dr. Albert Roy
Associate Research Professor of
Pathology
Childrens Hospital Medical Center
Harvard Medical School

Dr. Edward Webster
Director, Division of Radiological
Sciences
Massachusetts General Hospital
Associate Professor of Radiology
Harvard Medical School

Monday evenings, 7:00 to 9:30, 14 sessions, beginning October 7, 1974.
Tuition: \$200, including instructional material. Location: Henderson House,
Weston, Massachusetts. Three Continuing Education Units.

8406 Physiological Optics & Eye Protection

Participants are introduced to the eye's structure and function, the nature and hazards of eye injury, eye protection, and instrumentation related to ophthalmology. The course covers the fundamentals of anatomy, histology and physiology of the eye, principles of image formation, color vision and electroretinography, mechanical and chemical injury, environmental and radiation eye hazards and protection, and specific ophthalmologic instrumentation.

Faculty:

Dr. John C. Armington
Professor of Psychology
Northeastern University

Dr. Leo Chylack
Chief of Ophthalmology
Peter Bent Brigham Hospital,
Associate Professor of
Ophthalmology
Harvard Medical School

Dr. David Epstein
Clinical Fellow in Ophthalmology
Massachusetts Eye & Ear Infirmary
Harvard Medical School

Dr. Stephen Fricker
Chief of Ocular Motility
Massachusetts Eye and Ear Infirmary,
Assistant Professor of Ophthalmology
Harvard Medical School

Dr. William Holt
Clinical Fellow in Ophthalmology
Massachusetts Eye and Ear Infirmary
Harvard Medical School

Dr. Paul W. Lappin
Associate Professor of
Environmental Vision
Massachusetts College of
Optometry

Mr. Joel Newman
Consultant
Narco Medical Systems

Dr. Ernest Wolf
Research Associate in
Ophthalmology
Massachusetts Eye and Ear Infirmary
Instructor in Ophthalmology
Harvard Medical School

Dr. Samuel Fine,
Course Coordinator
Chairman, Department of Biophysics
and Biomedical Engineering
Northeastern University

Monday evenings, 7:00 to 9:15, 14 sessions, beginning February 24, 1975.
Tuition: \$175, including instructional material. Location: Henderson House,
Weston, Massachusetts. Three Continuing Education Units.

Note: Also see the following courses listed in the appropriate section:

- | | |
|------|---|
| 1910 | Pattern Recognition |
| 4125 | Introduction to Experimentation |
| 5960 | Data Acquisition Systems I |
| 7640 | Product Liability and Safety |
| 9550 | Industrial Hygiene |
| 9580 | Industrial Toxicology and Product Safety Evaluation |

Plant Engineering, Occupational Health, and Safety

2856 Noise Measurement and Control

The principles and practice of noise measurement and control are related to both in-plant noise programs and the control of community noise. Starting with codes and legal requirements, the course proceeds through the steps necessary to implement a noise control program. The selection, use and calibration of instrumentation are examined from the microphone through the measuring instruments, to detailed analyzers and systems. Equipment is available for the class to gain experience in taking actual field measurements. Work-related noise problems are solicited from the class.

Course Content Introduction to acoustics. Selection, use, and calibration of noise-measuring equipment: microphones, preamps and cable, sound level meters, sound analyzers, line spectrum analyzers, and recorder. Vibration measurement in noise control, sound power measurements, and noise criteria. Standards and codes in noise: ANSI, aircraft, traffic, residential, and industrial (OSHA, Boston Noise Ordinance, EPA). Review of current and proposed legislation. Noise measurement principles and practice. Products used in noise control. Hearing conservation programs.

Faculty: Mr. Basil Bonk
Acoustical Engineer
Jackson and Moreland, Inc.

Thursday evenings, 7:15 to 9:15, 14 sessions, beginning February 20, 1977.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9500 Air Pollution — Sources and Control

This course presents a comprehensive introduction to the sources of air pollution and to applications of control technology. Topics are considered in lectures, outside readings, site visits, and seminar discussions of source characteristics and control system performance. Work-related problems provided by participants are emphasized.

Course Content The nature of pollutants: solids, liquids, and gases. Typical stationary source characteristics: industrial, commercial, and combustion. Requirements for control, management, field operations, and technical services. Air analysis, meteorology, aerosol behavior, air and gas cleaning, legal and administrative aspects and federal and local regulations. Related problems such as cost of control, energy-costs, land use planning, and the like, as defined by individual interest.

Faculty: Dr. Charles E. Billings
Consultant

Monday evenings, 5:00 to 7:00, 14 sessions, beginning October 7, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

9504 Industrial Air and Gas Cleaning

For technical personnel concerned with the environmental control of dust, fumes, mist, gases and vapors, this course enables the participant to design, specify, operate, test and maintain air and gas cleaning systems. The operating principles and technology of typical systems are described. Emphasis is placed on the application of gas cleaning systems to typical problems and work-related problems submitted by the class. Laboratory sessions and site visits are used to illustrate the principles and operation of various air and gas cleaning systems. Familiarity with industrial ventilation principles is helpful.

Course Content Review of industrial ventilation. Air quality standards, threshold limit values. Federal laws and regulations of OSHA, EPA, AEC, BuMines, etc., state and local regulations. Measurement of particle, gas and vapor concentrations. Emission limits: performance testing and standards. Principles of fine particle behavior. Collection mechanisms, selection criteria for collection systems, performance specifications, pressure drop, collection efficiency, cost, life. Principles and applications of cyclones and inertial collectors, scrubbers, fabric filters, electrostatic precipitators, gas absorbers, package sorption systems for vapors, catalytic and thermal combustion systems for vapors, and other collection systems. Cases include: general industrial dust control problems from grinding, sawing, dusting, etc.; mist control in plating, anodizing, etc.; solvent vapor emission controls, scrubbing systems for SO₂ removal, NO_x control systems; office and plant internal air quality improvement; indoor-outdoor air pollution relationships; odor control problems; and control of airborne bacteria.

Faculty: Dr. Charles E. Billings
Consultant

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9535 Certified Safety Professional Exam Preparation

The Center for Continuing Education is planning to offer a course designed to prepare safety personnel for the Certified Safety Professional Examination. Complete details will be mailed to those who indicate interest by returning the reply card from the back of the catalog.

9540 OSHA Compliance

OSHA standards applicable to industrial work-places are interpreted and discussed in this course designed for safety personnel and others responsible for compliance. Visits to local plants are included to enable participants to gain experience in conducting safety surveys. Specialists present selected topics, and work-related problems are solicited from the class.

Course Content Description and interpretation of the following standards: walking and working surfaces, means of egress, occupational health and environmental control, hazardous materials, personal protective equipment, general environmental controls, medical and first aid, fire protection, compressed gas and compressed air equipment, materials handling and storage, machinery and machine guarding, hand and portable powered tools and other hand-held equipment, welding, cutting and brazing, special industries, and electrical. Sources of information and assistance.

Faculty: Mr. Norman D. Reece
Safety Engineer
Polaroid Corporation

Tuesday evenings, 5:00 to 7:00, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

9545 Fire Prevention and Safety

For safety directors and facilities planners, this course enables participants to make a critical evaluation of fire safety for existing and new facilities. A

systematic approach to life safety and fire loss control through proper design of facilities and effective operational procedures is presented. Measures required to comply with OSHA and other laws and codes are discussed.

Course Content Introduction to fire. Fire loss experience. A systematic approach to life safety and fire loss control. OSHA requirements. Ignition control; welding; process hazards: dusts, liquids, and vapors. Control of fire spread; interior finish and furnishings. Employee response; means of egress; fire brigades; fire safety inspections and process safety analysis. Automatic detection and alarm systems; detection principles; automatic sprinklers; special extinguishing systems: CO₂, Halon 1301, dry chemical. Smoke and heat control by building design. Fire department response to the fire threat: preplanning and coordination of activities. Building codes. Fire insurance.

Faculty: To be announced.

Spring semester. Fourteen sessions. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9547 Electrical Plant Engineering and Energy Conservation

For plant and electrical engineers responsible for the design or operating integrity of electrical systems, this course describes specific practices that enhance performance, reduce cost, and improve the reliability and safety of electrical systems. Work-related problems solicited from the class and case studies reflecting actual experiences with maintaining a plant in operation are discussed. The steps required to implement an effective energy conservation and cost reduction program are detailed. Procedures for coping with emergency situations are described. A site visit is planned to view systems in operation and guest lecturers will present selected topics. Participants should be familiar with electrical requirements and overall operating procedures in plant engineering.

Course Content Relationship between the plant and the utility company; rate structures, penalties, liabilities, budgeting, sub-allocating cost, energy conservation techniques and programs, system reliability, high voltage operating procedures, preventative maintenance programs, safety, OSHA, emergency situations, power failures, fires, fatalities, and repairs.

Faculty: Mr. George F. Charette
Chief Electrical Engineer
Waltham Plant
Polaroid Corporation

Thursday evenings, 5:00 to 7:00, 14 sessions, beginning October 10, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units. Also tentatively offered in the spring.

9549 Industrial Energy Management

This course develops guidelines for establishing an effective energy management program for manufacturing, industrial, and commercial process plants. Emphasis includes steam generation and distribution, dryers, furnaces, process heating, electric power use and methods of heat recovery such as waste heat boilers, heat wheels, and thermal insulation. More advanced means of improving energy use are explored such as combined power/process heat generation and the heat pump. Management of energy use is reviewed, including fuel economics, making an energy audit and establishing an energy management reporting system.

Course Content Energy management: fuel economics and availability making an energy audit, setting up an energy reporting system, relating energy use to production, steam costing, use of plant wastes as fuel, instrumentation. Steam generation and distribution: boiler efficiency, control of excess air flue gas losses, optimum steam pressure/temperature, condensate return, flash steam recovery, waste heat recycling. Dryers and furnaces thermal efficiencies, heat exchangers for waste heat, the heat wheel, waste heat boilers, thermal insulation. Electric power: motors, lighting, power factor, combined power/process heating cycles.

Faculty: Mr. Charles H. Marks
President
Energy Associates

Monday evenings, 7:15 to 9:15, 6 sessions, beginning October 7, 1974. Tuition: \$80, including instructional material. Location: Weston High School Weston, Massachusetts. 1.2 Continuing Education Units.

9550 Industrial Hygiene

This course covers the detection, evaluation and control of occupational health hazards and is designed for safety personnel, plant engineers, union and personnel management, and industrial medical staff. The hazard potential of common materials and processes, methods of evaluating the worker's exposure to toxic contaminants, and control of the exposure by engineering methods are discussed. Case histories provided by the instructor and students are used to illustrate key concepts. Class size is limited so topics of individual interest can be covered.

Course Content Toxic effects of exposure to air contaminants. Physical stresses: heat, noise, and vibration. Health hazards of common manufacturing and laboratory operations. Air sampling: sample collection, analytical methods, contaminant identification. Protective devices. Engineering control: general methods, ventilation control, respiratory protection. OSHA and other health and safety regulations. Commonly used instrumentation is demonstrated in laboratory sessions.

Faculty: Mr. William A. Burgess
Associate Professor of Environmental Health Sciences
Dr. John M. Peters
Associate Professor of Occupational Medicine
Harvard University School of Public Health

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9551 Radiation Protection

For health physicists, industrial hygienists and loss prevention personnel, engineers, and others interested in radiation protection, this program enables the participant to evaluate installations for radiological hazards. Techniques required to conduct radiation monitoring programs, including equipment selection, measurement scheduling, and data interpretation are covered. The measures required to bring an installation into compliance with various standards and regulations are described.

Course Content Radioactivity and radiations; decay and growth, alpha, beta, gamma, x-ray, neutrons. Interactions of radiation with matter; alpha and beta interactions — LET, photon interactions, neutron interactions. Radiation protection standards. Radiation detection and instrumentation; personnel monitoring, dosimeters, TLD, film, neutron detectors. Shielding; gamma, neutron. Contamination and surveys, airborne hazards, surface contamination, general radiation levels. Nuclear facilities and environmental radiation; licensing procedures, critical pathways. High-energy radiation (accelerators). Sources of population dose.

Faculty: Dr. Abraham S. Goldin
Associate Professor of Environmental Chemistry
Harvard School of Public Health

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning October 8, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9552 Introduction to Industrial Safety

With the passage of Public Law 91-596 "Occupational Safety and Health Act of 1970", employers find it increasingly important to maintain active and capably directed in-plant safety programs that assure compliance with the safety and health standards promulgated under the law. Many employers must now assign safety responsibilities to a staff member or line supervisor untrained in accident and loss prevention. This course provides the safety director with the skills needed to effectively assist management to reduce accident losses and at the same time be in compliance with the requirements of OSHA. Visits to local plants are planned for participants to gain experience in conducting safety surveys.

Course Content The causes, costs and types of accidents and their effects upon production, the requirements of OSHA, the safety director's duties, effective plantwide safety programs, productive accident investigation, area safety surveys, job safety analysis, employee safety training, maintaining safe working methods and conditions in connection with machine operation, materials handling, electrical equipment, housekeeping, fire and explosion hazards, and sources of assistance to the safety director are discussed.

Faculty: Mr. Paul M. Colson
Safety Consultant

Thursday evenings, 5:00 to 7:00, 14 sessions, beginning October 10, 1974. Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9553 Industrial Safety Management

This course provides the techniques required to implement an industrial loss prevention program. It broadens the participant's understanding of industrial hazards and their effects upon workers and their company. Participants are brought up-to-date with the latest developments in the operation of OSHA. The course helps companies to comply with OSHA standards and regulations as well as to deal with the problems arising from the growing complexity of modern production methods. Participants are exposed to new safety training techniques that they can use in their own on-the-job safety training. The team approach to industrial safety is emphasized.

Course Content The safety director as the manager of an overall loss-prevention program, implementing safety programs, on and off premises safety, modern techniques of machine guarding, control of occupational health hazards, industrial pollution, public and product liability, planning for

emergencies, preventive medical programs, and methods of supervisory safety training.

Faculty: Mr. Paul M. Colson
Safety Consultant

Thursday evenings, 5:00 to 7:00, 14 sessions, beginning February 20, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9555 Industrial Audiometry

Industrial hygienists and medical and safety personnel gain experience in evaluating the hearing of present and potential employees, interpreting audiometric findings, and identifying employees who show susceptibility to noise exposure. Participants are familiarized with current techniques and instrumentation required to conduct hearing evaluations. Demonstrations of both an industrial hearing conservation program and clinical audiology program are included. Enrollment is limited so topics of individual interest can be covered. The workshop sessions allow hands-on experience with equipment.

Course Content Medical-legal aspects of industrial noise, explanation of the Occupational Health and Safety Act. Workman's Compensation Insurance. Anatomy and physiology, and the mechanics of hearing. Methodology, calibration, and instrumentation employed by hearing evaluation. Types of noise exposure and hearing loss. Susceptibility to noise. Interpretation of audiometric findings and disposition. Types of safety products. Consequences of hearing loss and rehabilitation of acoustically impaired individuals.

Faculty: Dr. Robert J. Ferullo
Professor and Acting Chairman of Speech Pathology
and Audiology

Dr. Robert B. Redden, Course Coordinator
Assistant Professor of Audiology
Northeastern University

Mr. Stanley E. Pihl
Acoustical Consultant
Liberty Mutual Insurance Company

Dr. Harold Schuknecht
Chief of Otolaryngology
Massachusetts Eye and Ear Infirmary
Professor of Otology and Laryngology
Harvard Medical School

Thursday evenings, 5:00 to 7:00, 14 sessions, beginning October 10, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9557 Medical Radiation Protection

This course is designed for technicians or technologists in X-ray (diagnostic), nuclear medicine, or radiation therapy. It provides the necessary background to identify radiologically hazardous systems and procedures, and to conduct radiation survey programs. Techniques required to protect workers exposed to radiation and to minimize unnecessary patient dose are emphasized.

Course Content Radiations and radioactivity. Interactions of radiation with matter. Dosimetry. Radiation Guides. Medical contribution to population dose. Shielding, monitoring.

Faculty: Dr. Abraham S. Goldin
Associate Professor of Environmental Chemistry
Harvard School of Public Health

Dr. Bengt Bjarngard
Assistant Professor of Radiation Therapy
Harvard Medical School
Peter Bent Brigham Hospital

Mr. Gerald S. Parker
Assistant to the Commissioner for Radiological Health
Department of Public Health
Commonwealth of Massachusetts

Tuesday evenings, 7:15 to 9:15, 10 sessions, beginning February 8, 1975.
Tuition: \$130, including instructional material. Location: Weston High School, Weston, Massachusetts. Two Continuing Education Units.

9560 Industrial Ventilation

This course provides an understanding of the principles of air flow and flow measurement necessary for the design of industrial ventilation systems. The program also covers practical concepts for the engineering design of systems to protect workers from hazardous environments such as dust, fumes, mist, gases and vapors. The design of exhaust ventilation systems is emphasized including the requirements of make-up air supplies and devices used for this purpose.

Course coverage includes concepts required to evaluate and improve existing systems as well as to design and prepare specifications for new systems. Each class session is divided between a lecture and a laboratory session permitting the participant to get actual hands-on experience in designing ventilation systems. The course is intended for safety engineers; industrial hygienists; industrial and plant engineers; mechanical, heating, and ventilating engineers; and others who have an interest in or responsibility for the safety and comfort of industrial workers.

Course Content Flow of fluids and flow measurements. Exhaust hood design principles and hood shapes for specific operations. Duct resistance and piping design principles. Fans and blowers, dust collecting devices, and make-up air systems. Preparation of construction specifications. Control of industrial dust and vapor exposures by dilution ventilation. Class size will be limited so that each student will have ample opportunity to participate actively in the many important laboratory exercises which constitute an essential part of the instruction.

Faculty: Dr. Charles E. Billings
Consultant

Professor Richard Dennis
Harvard University and Technology Division
G. C. A. Corporation

Mr. Frederick J. Viles, Jr.
Consultant

Tuesday evenings, 7:15 to 9:15, 14 sessions, beginning February 18, 1975. Tuition: \$200, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9571 Occupational Medicine

The toxicologic, epidemiologic, and medical aspects of occupational health are discussed. It is designed for nurses, safety personnel, industrial hygienists, union and personnel management, and is intended to complement course 9550, Industrial Hygiene. Coverage includes techniques for early detection of occupational disease, systems for surveillance of workers exposed to various hazardous materials, strategies for placement of workers, and prevention of job-related sickness. Case histories of classic occupational diseases and work-related problems submitted by participants are discussed.

Course Content Industrial toxicology. Toxicity of heavy metals—lead, mercury. Pulmonary reaction to disease producing dusts—silica, asbestos. Occupational hazards of solvents—trichlorethylene, benzyne. Asphyxiants

such as carbon monoxide and cyanide are classified and proper treatment considered. Medical surveillance programs for noise, dust, vapor, gas, and fume exposures are elucidated along with existing or proposed OSHA standards governing them. Epidemiologic principles and research data. The use and importance of epidemiology as a method to detect death, disease, and disability. Rehabilitation and reentry of disabled workers. Avenues for resolution of occupational health problems: workmen's compensation carrier, union negotiation, state and federal programs including OSHA.

Faculty: Dr. John M. Peters
Associate Professor of Occupational Medicine
Harvard University School of Public Health
Dr. David H. Wegman
Physician, Division of Occupational Health
Commonwealth of Massachusetts
Assistant Professor of Occupational Medicine
Harvard University School of Public Health

Monday evenings, 7:15 to 9:15, 14 sessions, beginning February 24, 1975.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9580 Industrial Toxicology and Product Safety Evaluation

The principles of toxicology and occupational medicine are applied to safety in manufacturing processes and product use. The techniques required to evaluate hazard and risk of chemical injury and disability in the workplace and at the point of product utilization are developed. Participants will have opportunities to present work-related cases. The course is designed for industrial hygienists, medical and safety personnel, product development engineers, chemists and laboratory technicians, and others with interest in consumer product safety and industrial health.

Course Content Mammalian Physiology—normal and aberrant function of the heart, lungs, brain, liver, and kidney. The role of toxic substances in producing dysfunction, routes of entry, and mechanisms of detoxication. Chemical injury surveillance methods and measurement techniques: pulmonary function testing, hematology, neurologic function, and major organ testing. Environmental sampling methods and analytical techniques: air quality monitoring, gas chromatography, and laboratory techniques. Product safety evaluation. OSHA and Consumer Product Safety Act regulations. Case studies: carcinogens, vinyl chloride, asbestos, solvents, aerosol packaging

and product hazard, and plastics as food packaging materials. Work-related problems submitted by participants.

Faculty: Dr. Rudolph J. Jaeger, Course Coordinator
Assistant Professor of Toxicology
Harvard University School of Public Health

Dr. Franklin E. Mirer
Research Associate in Toxicology
Harvard University School of Public Health

Dr. John M. Peters
Associate Professor of Occupational Medicine
Harvard University School of Public Health

Dr. David H. Wegman, Course Coordinator
Physician, Division of Occupational Health
Commonwealth of Massachusetts, and
Assistant Professor of Occupational Medicine
Harvard University School of Public Health

Monday evenings, 6:00 to 8:00, 15 sessions, beginning October 7, 1974.
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

9602 Construction Safety and Loss Control

For construction management and others with responsibilities for safety and loss control in the construction industry, this course provides the background information and specific techniques required to conduct an effective company-wide and on-site loss control program. It is designed to help contractors comply with OSHA standards and to improve the firm's loss control program.

Course Content Loss control philosophy and techniques. OSHA. Job planning. Communication of the loss control program to top management, superintendents, foremen, and workers. Detailed coverage of how to comply with the most frequently violated OSHA standards: personal protective equipment, trenching and excavation, fire protection, electrical hazards, heavy equipment, floor and wall openings, ladders and scaffolding, house-keeping, hand and power tools, welding and cutting. Company program: what goes into it and how it works.

Faculty: Mr. John F. Barry
Safety Engineer
Commercial Union Assurance Companies

Mr. Wilbar M. Hoxie
Chief of the Safety Office
New England Division
U.S. Army Corps of Engineers

Mr. William W. Kane, Course Coordinator
Executive Assistant
Associate General Contractors of Massachusetts

Mr. C. Russell Mattson
Manager of Safety
Perini Corporation

Monday evenings, 7:15 to 9:15, 12 sessions, beginning October 7, 1974.
Tuition: \$150, including instructional material. Location: Weston High School, Weston, Massachusetts. 2.4 Continuing Education Units.

Note: Also see the following courses listed in the appropriate section:

- 8314 Physiology and Biomedical Engineering
- 8318 Anatomy and Physiology
- 8406 Physiological Optics and Eye Protection

Civil Engineering and Building Technology

9650 Modern Structural Steel Design

Recent advances in design techniques, new materials, utilization of structural steel, and connection methods have recently emerged. This course for practicing professionals uses case studies to discuss up-to-date principles and practices in structural steel design and construction. New techniques are linked with current specifications and codes with a view toward improved economies.

Course Content Availability and selection of structural steels. Inelastic design of columns. Composite beams and structural systems: metal deck systems, lightweight concrete, design of shear studs, effects of shrinkage and creep, interaction considerations. Welded and bolted connections: design, installation, and inspection of bolted joints, moment connections, prying force considerations, stiffener requirements for welded and bolted joints. Lamellar tearing, its causes and remedies. Bracing requirements for structural members; fatigue consideration in buildings. Fire protection of steel structures: basic concepts of fire technology, protection materials, systems solutions, extrapolation of test results, design of fire protection assemblies. Fabrication of structural steel: fabricator/structural engineer relations, structural steel detailing, proper use of welded and bolted connections. Residual stresses in steel: their causes and effects, selection of built-up members, stress concentrations due to residual stress, selection of welding sequences and methods. Work-related problems are solicited from the class.

Faculty: To be announced.

Spring semester. Location: Boston Campus. Return reply card for complete details.

9680 Concrete and Aggregate Technology

Techniques used to specify, prepare, apply, and test concrete are presented. The interaction between ingredients of plain concrete, including additives

and the achievement of economical, strong, safe mixtures, properly placed and cured is discussed. The program is intended for engineers and technicians employed by engineering and architectural firms, contractors, public utilities, city and state agencies, and materials suppliers. This course is co-sponsored by the Massachusetts Concrete Industries Board and the New England Section of the American Concrete Institute.

Course Content Fundamentals of concrete: kinds, uses, properties, requirements. Inspection: importance, equipment, reading of plans and specifications responsibility. Cement: types, sampling, storing and handling, batching. Aggregates: typical tests, aggregate production, specifications, undesirable characteristics. Control of proportions: field control of quality, mix proportions, methods of specifying mixes. Other materials: water, admixtures, embedded items, curing aids, joint compounds. Preparation for concreting: forms, placing reinforcement, embedded fixtures, special equipment, weather precautions. Concrete placement: working conditions, batching, mixing, finishing, curing, conveying, vibrating. Field testing: sampling, tests of fresh concrete, destructive and non-destructive testing, evaluation of test results. Special problems: cold weather, shotcrete, gunite, coloring, lightweight, heavyweight. Faulty concrete: failure to set, lack of strength, excess shrinkage, harsh mixes, bleeding. Laboratory session: demonstration of equipment at a local laboratory, grading of aggregates, typical materials.

Faculty: Mr. Russell F. Geisser
President
R. F. Geisser & Assoc. Inc.

Monday evenings, 7:15 to 9:15, 14 sessions, beginning October 7, 1974
Tuition: \$175, including instructional material. Location: Weston High School, Weston, Massachusetts. Three Continuing Education Units.

Note: Also see the following courses listed in the appropriate section:

- | | |
|------|---|
| 1030 | Professional Engineers License Exam Preparation: EIT |
| 1031 | Professional Engineers License Exam Preparation: Mechanical Engineering I |
| 1033 | Professional Engineers License Exam Preparation: Electrical Engineering |
| 7510 | Project Administration |
| 7513 | Project Financial Management |
| 7570 | Finance for Engineers |
| 7580 | Trends and Concepts in Engineering Management |
| 9500 | Air Pollution—Sources and Control |
| 9602 | Construction Safety |

Urban Development

9706 Current Issues in Urban Development

This seminar series provides an analysis of issues facing municipal governments and discusses alternatives for coping with them. Emphasis is placed on the translation of public policy objectives into realistic resolution of urban problems through actual examples. During discussions, participants are encouraged to relate their own experiences to problems of government in their municipalities. The seminars also provide opportunities for deeper insights to municipal problems so that persons professionally committed to finding and implementing solutions, or those persons having a stake in urban development, are enabled to perform their work with greater effectiveness.

Course Content Physical and Economic Development: economic and industrial development, urban housing, urban transportation. Municipal Services: water resources and solid waste management, public safety administration, environmental quality control. Fiscal Problems and Urban Policy: financing municipal government, new directions for city government.

Faculty: Senior Staff and Directors of
Urban Systems Research and Engineering, Inc.,
including:

Dr. Anothony J. Blackburn
Harvard University
President, USR&E

Ms. Christa L. Carnegie
Senior Housing Specialist, USR&E

The Honorable John F. Collins
Massachusetts Institute of
Technology
Director, USR&E

Mr. Paul A. Hoxie
Director, Transportation Systems
USR&E

Dr. Theodore Herman
Director, Environmental Systems
USR&E

Mr. James R. McGibbon
Senior Principal Analyst, USR&E

Thursday evenings, 7:00 to 9:30, 8 sessions, beginning October 10, 1974.
Tuition: \$100, including instructional material. Location: Henderson House,
Weston, Massachusetts. Two Continuing Education Units.

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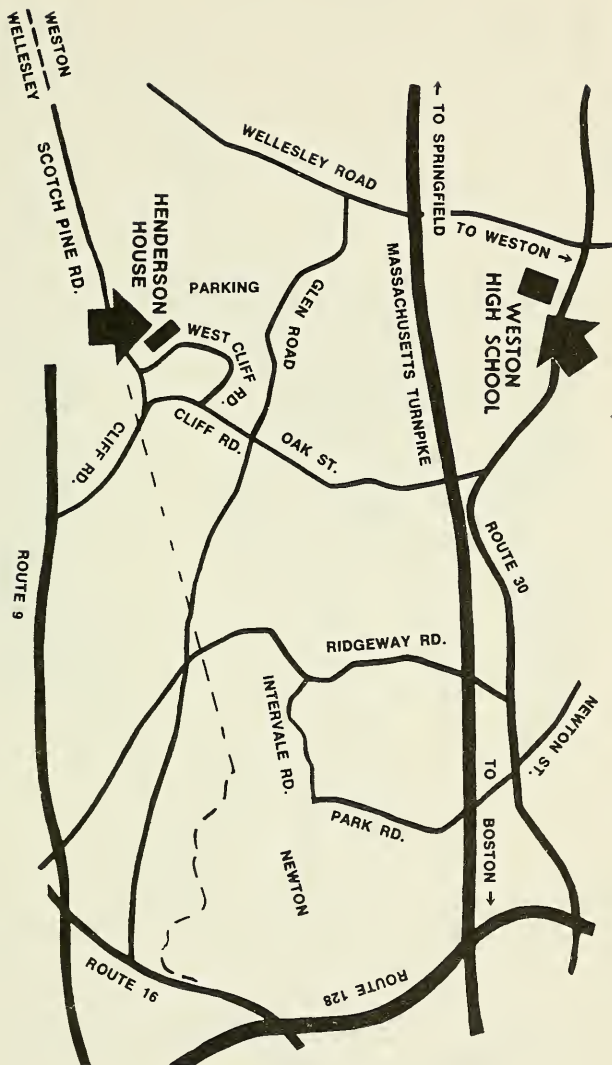
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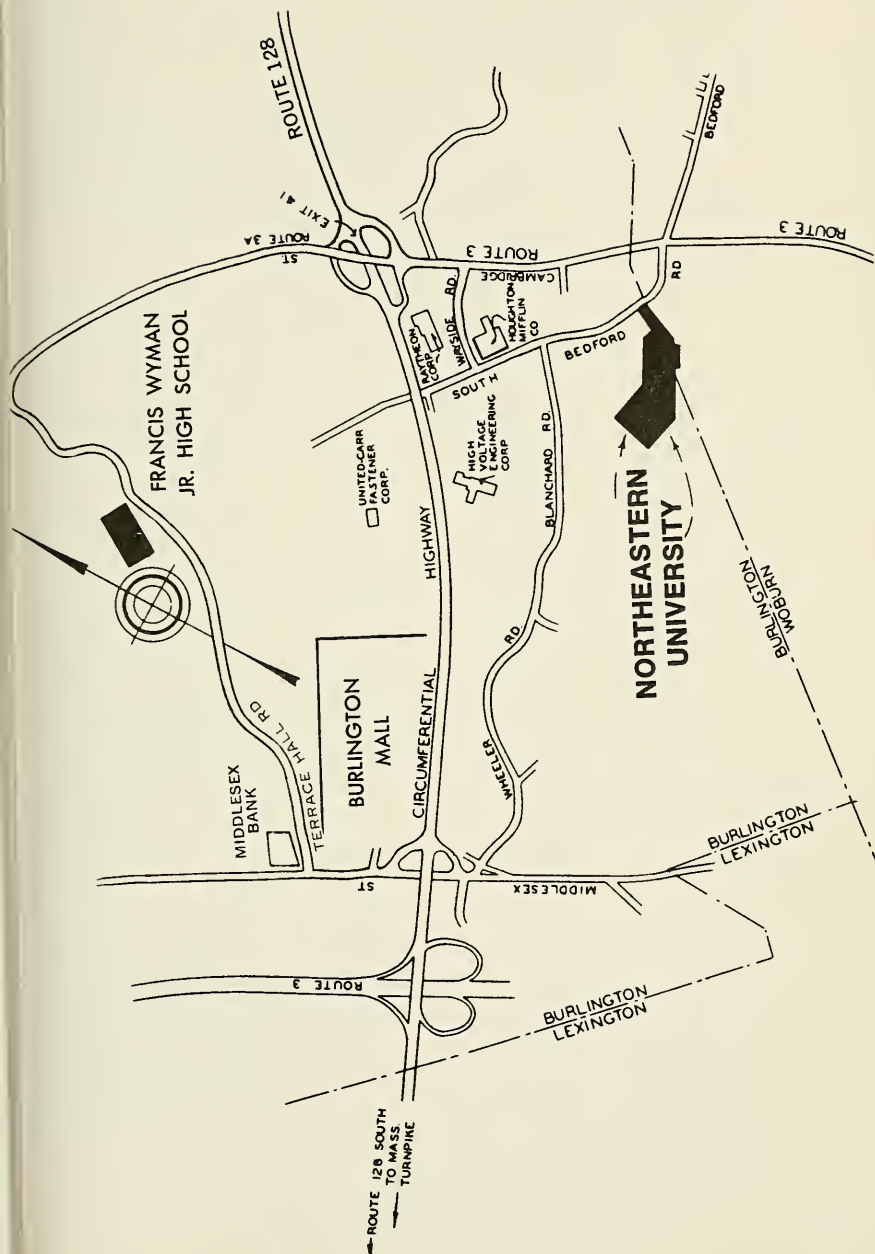
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Suburban Campus





northeastern university bulletin

Lincoln College 1974-75

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science technology

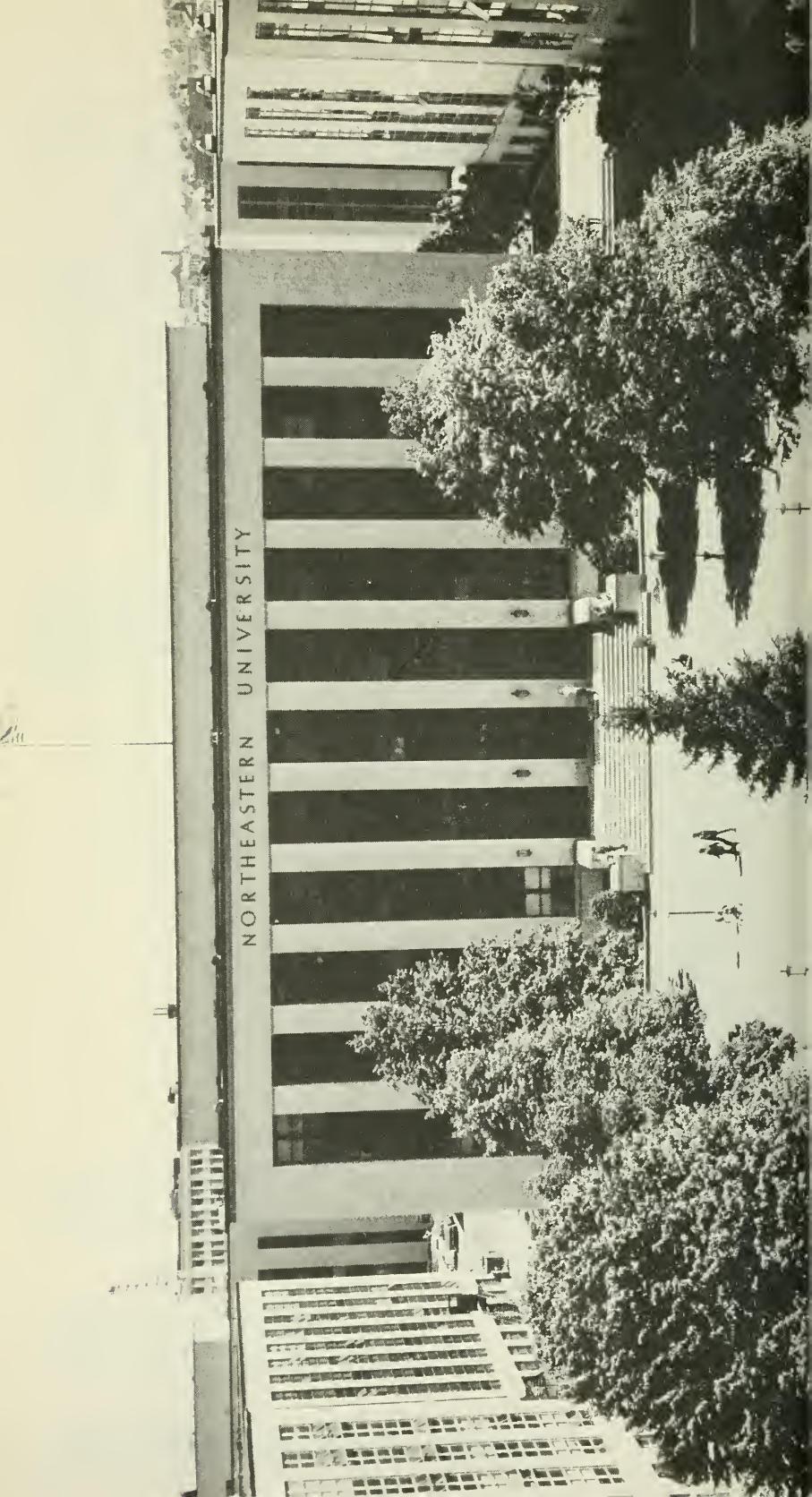


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Lincoln College 1974-75

NORTHEASTERN UNIVERSITY



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- F4
- F7
- G10
- B6
- E4
- E4
- J3
- H3
- F9
- F3
- E7
- H9
- G5

Building

- Barletta Natatorium
- Botolph Building
- Cabot Physical Education Ctr.
- Churchill Hall
- Cushing Hall
- Dana Research Center
- Dockser Hall
- Ell Student Center and
Alumni Auditorium
- Forsyth Building
- Forsyth Building Annex
- Greenleaf Building
- Hayden Hall
- Hurtig Hall
- Kennedy Building
- Knowles Center (Volpe)
- Knowles Center (Gryzmish)
- 11 Leon Street
- Afro-American Institute
- Mugar Life Sciences Building
- Parker Building
- Richards Hall
- Robinson Hall
- United Realty Building

**Building
Designation**

- BN
- BT
- CB
- CH
- CU
- DA
- DK
- DG
- EC
- EL
- FR
- FA
- GR
- HA
- HT
- KB
- KV
- KG
- UO
- AF
- MU
- PA
- RI
- RB
- UR

Office Hours at Huntington Avenue Campus, Boston

June 24, 1974 — September 3, 1974

Monday-Thursday 8:30 A.M.-8:30 P.M.

Friday 8:30 A.M.-4:30 P.M.

September 3, 1974 — June 13, 1975

Monday-Friday 8:30 A.M.-8:30 P.M.

Program Counseling at Suburban Campus, Burlington

Representatives from the Huntington Avenue Campus will be in attendance during specified dates for guidance and counseling. The bookstore and the Bursar's Office are open from 8:30 a.m.-8:30 p.m., Monday-Friday, and 8:30 a.m.-12:00 p.m., Saturday.

Program Counseling at Extensions

Program counselors are available on a regular schedule at Lincoln College extensions at: the Wyman Junior High School, Burlington; the North High School, Framingham; the North High School, Weymouth; the English High School, Lynn; the Junior High School North, Norwood; and the Norwood Airport, Norwood. Appointments may be arranged by telephoning the Lincoln College office at 437-2500.

Interviews

Prospective students, or those desiring advice or guidance regarding any part of the school work or curricula, are encouraged to arrange for personal interviews. Career planning through competent guidance provides an understanding of professional requirements and develops that definiteness of purpose so vital to success. Lincoln College Office is located at 219 Hayden Hall at the Boston Campus.

Address communications to:

William F. King, Director
Lincoln College
Northeastern University
360 Huntington Avenue
Boston, Massachusetts 02115
Telephone 437-2500

1974-1975 ACADEMIC CALENDAR

Fall Quarter 1974

Classes Begin Monday, September 30, 1974

FALL REGISTRATION DATES

Boston	5:30-8:30 p.m.	Monday-Friday, September 16-20
Boston	9:00 a.m.-12 noon	Saturday, September 21
Boston	5:30-8:30 p.m.	Monday-Thursday, September 23-26
Burlington	5:30-8:30 p.m.	Monday-Thursday, September 23-26
	12 noon-8:30 p.m.	Tuesday, September 17
Boxford (Masconomet Regional)	5:30-8:30 p.m.	Tuesday, September 17 and Monday, September 23
Framingham North H. S.		
Haverhill H. S.		
Lynn English H. S.		
Weymouth North H. S.		
Norwood Jr. H. S. North		
Milford H. S.	5:30-8:30 p.m.	Monday, September 16, and Monday, September 23
Classes begin		September 30
Columbus Day Observed	No Classes	Monday, October 14
Veterans Day Observed	No Classes	Monday, October 28
Thanksgiving Recess	No Classes	Thursday-Saturday, November 28-30
Final Examination Period For Fall Quarter		Monday, December 16- Saturday, December 21

Winter Quarter 1974-1975

Classes Begin Wednesday, January 6, 1975

WINTER REGISTRATION DATES

Boston	5:30-8:30 p.m.	Monday-Friday, December 16-20
Boxford (Masconomet)	5:30-8:30 p.m.	Tuesday and Thursday, December 17 and 19
Burlington	5:30-8:30 p.m.	Monday-Thursday, December 16-19
Framingham North H. S.	5:30-8:30 p.m.	Monday-Thursday, December 16-19
Haverhill H. S.	5:30-8:30 p.m.	Monday and Tuesday, December 16-17
Lynn English H. S.	5:30-8:30 p.m.	Monday and Wednesday, December 16 and 18
Milford H. S.	5:30-8:30 p.m.	Monday and Tuesday, December 16 and 17
Norwood Jr. H. S. North	5:30-8:30 p.m.	Monday and Tuesday, December 16-17
Weymouth North H. S.	5:30-8:30 p.m.	Monday-Thursday, December 16-19
Christmas Vacation	No Classes	Monday, December 23- Saturday, January 4
Winter Quarter Classes Begin		Wednesday, January 6
Washington's Birthday Observed	No Classes	Monday, February 17
Final Examination Period for Winter Quarter		Monday, March 24- Saturday, March 29

Spring Quarter 1975

Classes Begin Monday, April 7, 1975

SPRING REGISTRATION DATES

Boston	5:30-8:30 p.m.	Monday-Friday, March 24-28
Boxford (Masconomet)	5:30-8:30 p.m.	Tuesday and Thursday, March 25 and 27
Burlington	5:30-8:30 p.m.	Monday-Thursday, March 24-27
Framingham North H. S.	5:30-8:30 p.m.	Monday-Thursday, March 24-27
Haverhill H. S.	5:30-8:30 p.m.	Monday and Tuesday, March 24 and 25
Lynn English H. S.	5:30-8:30 p.m.	Monday and Wednesday, March 24 and 26
Milford H. S.	5:30-8:30 p.m.	Monday and Tuesday, March 24 and 25
Norwood Jr. H. S. North	5:30-8:30 p.m.	Monday and Tuesday, March 24 and 25
Weymouth North H. S.	5:30-8:30 p.m.	Monday-Thursday, March 24-27
Spring Recess* (Or Make Up Period for Lost Snow Days)		Monday, March 31- Saturday, April 5
Spring Quarter Begins		Monday, April 7
Patriot's Day Observed	No Classes	Monday, April 21
Memorial Day Observed	No Classes	Monday, May 26
Final Examination Period for Spring Quarter		Tuesday, June 17- Monday, June 23
Commencement		Sunday, June 22

Summer Quarter 1975

Classes Begin Monday, June 30, 1975

REGISTRATION FOR ENTIRE SUMMER QUARTER

Boston	5:30-8:30 p.m.	Monday-Friday, June 16-20
Burlington	12 noon-8:30 p.m.	Tuesday, June 17
Classes Begin		Monday, June 30
Registration for Second Six Week Term		
Boston	5:30-8:30 p.m.	Monday and Tuesday, August 4 and 5
Burlington	5:30-8:30 p.m.	Monday, August 4
Independence Day Observed	No Classes	Thursday, July 4
Labor Day Observed	No Classes	Monday, September 1
Final Examination Period for Summer Quarter		Monday, September 15- Thursday, Sept. 18

Equal Opportunity Policy

Northeastern University is committed to a policy of providing equal opportunity for all. In all matters involving admission, registration, and all official relationships with students, including evaluation of academic performance, the University insists on a policy of nondiscrimination. Northeastern University is also an equal opportunity employer; it is institutional policy that there shall not be any discrimination against any employee or applicant for employment because of race, color, religion, sex, age, or national origin.

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the university

Founded in 1898, Northeastern University is incorporated as a privately endowed, nonsectarian institution of higher learning under the General Laws of Massachusetts. The State Legislature by special enactment has given the University general degree-granting powers. The University is governed by a Board of Trustees elected by and from the Northeastern University Corporation, which is composed of more than 150 distinguished business and professional men and women.

From its beginning Northeastern University has had as its dominant purpose the discovery of community educational needs and the meeting of these in distinctive and serviceable ways. The University has not duplicated the programs of other institutions, but has sought to pioneer new areas of educational service.

A distinctive feature of Northeastern University is its Cooperative Plan, initiated by the College of Engineering in 1909 and subsequently adopted by the Colleges of Business Administration (1922), Liberal Arts (1935), Education (1953), Pharmacy (1962), Nursing (1964), Boston-Bouvé College (1964), the College of Criminal Justice (1967), and by Lincoln College's Engineering Technology Programs (1971). This educational method enables students to gain valuable practical experience as an integral part of their college programs and also provides the means by which they may contribute substantially to the financing of their education. The Plan has been extended to the graduate level in engineering, mathematics, actuarial science, rehabilitation administration, professional accounting, business administration, and law.

In the field of adult education, programs of study have been developed to meet a variety of needs. Since 1906 evening curricula have been offered leading to the bachelor's degree. Programs in the arts and sciences, engineering, various fields of business, law enforcement and security, and other areas have been carefully planned to serve mature students who are employed full time during the day and want to broaden their educational background by part-time study. All formal courses of study leading to degrees through evening programs are approved by the Basic College faculties concerned and are subject to the same quantitative and qualitative standards as the regular day curricula.

UNDERGRADUATE COLLEGES

Boston-Bouvé College

Boston-Bouvé College offers four major programs of study: physical education, recreation education, and health education, both leading to the degree of Bachelor of Science in Education; and physical therapy, leading to the degree of Bachelor of Science in Physical Therapy.

The combined programs of liberal arts, science, and professional preparation include field experience and student teaching, and leadership training in camping and outdoor education at the Warren Center for Physical Education and Recreation in Ashland. In accordance with Northeastern's Cooperative Plan of Education, students are offered varied opportunities for alternate terms of work-study experience during upper-class years.

The College of Business Administration

The College of Business Administration offers programs of study in the principal fields of business leading to the degree of Bachelor of Science in Business Administration. These programs are offered on the five-year Cooperative Plan, under which students gain substantial practical experience in the fields for which they are preparing as an integral part of their undergraduate course of study.

The College also sponsors a Management Institute which offers various special courses for business and industrial executives. One phase of the Institute's work is carried on by the Center for Management Development, which annually conducts an intensive program designed to provide professional growth for middle-management executives who will ultimately be called upon to carry broader executive responsibilities. The plan of instruction, based on a modification of the Northeastern Cooperative Program, permits the participants to maintain their job responsibilities during the six-month period of the course. The Management Development Program is conducted at Andover, Massachusetts, on the campus of Andover Academy.

College of Criminal Justice

The College of Criminal Justice offers full-time day curricula on the Cooperative Plan leading to the degree of Bachelor of Science.

The College of Education

The College of Education offers programs leading to the degree of Bachelor of Science in Education. These are designed particularly to meet the needs of high school graduates who desire to prepare themselves for teaching or administrative positions in elementary and secondary schools. Curricula are offered on the five-year Cooperative Plan, which provides for employment in libraries, social service agencies, and school systems.

The College of Engineering

The College of Engineering offers five-year cooperative curricula in civil, mechanical, electrical, chemical, and industrial engineering leading to the degree of Bachelor of Science with specification according to the engineering department in which the student qualifies. The College also offers a general engineering program awarding an unspecified Bachelor of Science degree where the student has the opportunity to design his own program with his career objectives in mind. A six-year program in power systems engineering in collaboration with public utilities leads to both the bachelor's and master's degree in electrical engineering. During evening hours are part-time programs leading to the Bachelor of Science degrees in Electrical Engineering and Civil Engineering. These programs extend over eight years, cover the identical courses given in the day cooperative curriculum, and meet the same qualitative and quantitative standards of scholarship.

The College of Liberal Arts

The College of Liberal Arts offers majors in the arts and sciences leading to the degree of Bachelor of Arts. With the exception of preprofessional programs, curricula are normally five years in length and operate on the Cooperative Plan.

Lincoln College

Lincoln College offers engineering technology programs leading to the Associate in Engineering, the Associate in Science, and the Bachelor of Engineering Technology degrees. These programs are made available as:

- (a) A full-time day curricula on the Cooperative Plan leading to the degree of Bachelor of Engineering Technology (B.E.T.) in Mechanical or Electrical Engineering.
- (b) A part-time evening program including pretechnology preparatory courses and degree programs leading to the Associate in Engineering (A.E.); and the Bachelor of Engineering Technology (B.E.T.) in Civil, Mechanical, or Electrical Engineering. The Associate in Science degree may be earned in the Mathematical, Physical, and Chemical Sciences.
- (c) Lincoln College part-time students whose work schedule does not permit them to attend regular evening classes may register for a maximum of 8 quarter hours of course work per quarter in the Lincoln College Day Program.

Registration materials will be available Monday through Friday in Room 219 Hayden Hall, Boston Campus only, during the week preceding the start of each quarter. The day class schedule will not be available at other campus locations. The Registrar

will not accept registration materials for day classes without the approval of the Director of Lincoln College. Tuition will be billed at normal evening part-time rates.

Interested students should consult course listing (page 153) to determine equivalent day courses.

The day B.E.T. program is designed to meet the needs of the high school graduate or the student transferring from a community college or technical institute and who desires the full time day curricula on the Northeastern Cooperative Plan.

In addition to its traditional curricula, Lincoln College Evening School offers interdisciplinary and certificate programs providing technological and professional development opportunities to meet special needs of the part-time student. These programs are designed to provide trained people for ready assimilation by the engineering field and to prepare students for the challenge of interfacing technology and society.

Recognizing the increasing need for higher levels of technical efficiency in fire investigation, fire prevention, and fire protection, Lincoln College, in collaboration with local firefighting agencies, has designed a part-time evening program leading to an Associate in Science degree in Fire Technology. The curriculum includes a broad spectrum of those science technologies which are basic in coping with the firefighting problems attendant to the complexities of today's society.

The College of Nursing

The College of Nursing offers two separate and distinct programs of study, both organized on the Cooperative Plan:

- (a) A three-year curriculum in preparation for the R.N. Examinations leading to the Associate in Science degree.
- (b) A five-year curriculum also preparing students for the R.N. Examinations, and leading to the degree of Bachelor of Science in Nursing.

Five of Boston's leading hospitals — Beth Israel, Children's Hospital Medical Center, New England Deaconess, Peter Bent Brigham, and Massachusetts General — collaborate with Northeastern by providing suitable cooperative work opportunities during the upper-class years of these programs.

The College of Pharmacy and Allied Health Professions

The College of Pharmacy and Allied Health Professions offers five-year cooperative curricula leading to the degree of Bachelor of Science in Pharmacy, and to the Bachelor of Science degree with majors in medical laboratory science (medical technology; cytotechnology, hematology), medical record administration, and management in health care agencies and institutions. Associate degree programs are offered in medical laboratory science, respiratory therapy, dental hygiene, and cytotechnology. The

College has academic responsibility and, in cooperation with the medical schools and teaching hospitals in the Boston area, offers the professional program for physician assistants.

University College

University College, so called because it draws upon the resources of the other colleges of the University, offers part-time programs in Liberal Arts, Business Administration, Law Enforcement, Education, and Health, leading to the Associate in Science, Bachelor of Arts, and Bachelor of Science degrees. It does not duplicate the offerings of the day college, but provides curricula which cut across traditional subject-matter areas to meet the particular needs of adult students. Students may pursue a degree or simply take courses, based on needs and interests, up to a total of forty quarter hours of credit. Courses are offered in Boston as well as at Boxford, Burlington, Framingham, Lynn, Haverhill, Milford, Weymouth, and several other convenient locations.

Adult Day Programs refers to University College courses that are offered Monday through Friday, 9:00 a.m. to 5:00 p.m., to meet the needs of adults with family or other obligations who wish to engage in part-time study during the day. In addition to the daytime offering of regular University College credit courses, Adult Day Programs also offers daytime workshops and conferences, sometimes over weekends, with the option for credit. Adult Day Programs are offered primarily on the Boston and Burlington campuses, with a limited number of courses offered at other off-campus locations.

Students may enroll as degree candidates or elect single courses appropriate to their needs and interests. Courses are scheduled in the day and evening at the Boston Campus, Suburban Campus in Burlington, and other off-campus locations near Boston.

GRADUATE SCHOOLS

Actuarial Science

Master of Science in Actuarial Science.

Arts and Sciences

The Master of Arts degree may be earned in economics, English, history, political science, psychology, sociology, and social anthropology. The Master of Science degree is available in biology, chemistry, mathematics, and physics. The Master of Science in Health Science and the Master of Public Administration degrees are also offered. In addition, there are programs leading to the Doctor of Philosophy degree in biology, chemistry, economics, mathematics, physics, psychology, and sociology.

Boston-Bouvé College

Master of Science in Physical Education and Master of Science in Recreation Education.

Business Administration

Master of Business Administration.

Criminal Justice

Master of Science in Criminal Justice.

Education

Master of Education, and the Certificate of Advanced Graduate Study.

Engineering

Master of Science with course specification, including a special six-year program in Power Systems Engineering leading to both bachelor's and master's degrees in Electrical Engineering; a similar six-year program in Mechanical Engineering leading to both bachelor's and master's degrees; the Master of Science degree in Civil Engineering; master's degrees in the fields of Industrial Engineering and Engineering Management; the professional Engineer degree in Electrical Engineering; the Doctor of Engineering degree in Chemical Engineering; and the Ph.D. degree in the fields of Electrical, Chemical, Civil, and Mechanical Engineering. In addition, the intermediate degree of Engineer is offered.

Law

The School of Law offers a full-time program of professional instruction leading to the degree of Juris Doctor (J.D.). The three-year curriculum includes twelve months of experience in law offices. There are no courses for part-time or evening students.

Pharmacy and Allied Health Professions

Master of Science with specialization in Hospital Pharmacy, Industrial Pharmacy, Medical Chemistry, Pharmacology, Medical Laboratory Science, and Doctor of Philosophy in Medical Chemistry.

Professional Accounting

A five-quarter curriculum leading to the degree of Master of Science in Accounting.

Some of these programs are offered on the Cooperative Plan; others provide teaching and research fellowships for able candidates. The graduate schools are under the jurisdiction of the basic college deans.

CENTER FOR CONTINUING EDUCATION

The Center for Continuing Education was established to relate the University to the needs of its community in a period of accelerated change. Its programs are composed of seminars, conferences, institutes, forums, and a wide variety of special courses designed to serve specific needs. The Division of Special Programs, working cooperatively with trade associations

and professional societies, offers a wide variety of programs dealing with current needs and problems. Through its Division of Community Services, working with governmental agencies and community organizations, the Center is becoming increasingly involved in social problems on both the local and national level.

Many of these programs are conducted at Henderson House, Northeastern University's conference center in Weston, Massachusetts.

OFFICE OF EDUCATIONAL RESOURCES

The Office of Educational Resources exists to provide (1) facilities and services that enhance student learning, (2) instructional services and equipment that assist faculty in providing efficient and effective instruction, and (3) research and development directed toward the ultimate implementation of empirically tested instructional systems and innovations. The Instructional Systems Analysis Group, a Special Projects Group, and three divisions—Programmed Learning, Instructional Media, Instructional Communications—carry out the objectives. Of particular student interest is the Center for Programmed Study located in 211 Dodge. There, students study courses taught via self-instructional programs, use programs to supplement course work, fulfill course prerequisite requirements, pursue remedial or review knowledge, or study just for fun. Each student's activity and progress is constantly monitored; faculty assist when content problems arise. Also of note is the Instructional Materials Information Center which provides a central facility and clearinghouse concerning state-of-the-art information on educational technology and innovations; and houses instructional materials from preschool through graduate levels such as texts, programs, activity boxes, slides, filmstrips, illustrations, motion pictures, laboratory kits, simulations, models, video and audio tapes, teacher's manuals, curriculum guides, research reports, standardized tests and other instructional support materials.

DAY PROGRAMS FOR ADULTS

These programs were developed to meet the needs of adults who wish to engage in part-time study during the day only. Non-credit courses and undergraduate and graduate degree programs are offered at the Boston and Burlington campuses. Included are courses from the Graduate School of Education, the Graduate School of Arts and Sciences, University College, and the Center for Continuing Education. A Human Relations and Adult Counseling Program is also offered.

AFFILIATED PROGRAMS

For Dental Hygienists

The Forsyth School for Dental Hygienists conducts a two-year program of dental hygiene education and general education in cooperation with

Northeastern University. Graduates of the program receive the Certificate in Dental Hygiene from Forsyth and the degree of Associate in Science from Northeastern University. After receiving the Associate degree, students may pursue the Bachelor of Science degree from University College on a part-time basis.

Aviation Technology

Lincoln College, in collaboration with Wiggins Airways, Inc., conducts full-time day programs in Aviation Technology in which the student earns the Associate in Science degree and may become licensed by the Federal Aviation Administration with commercial, instrument, and instructors pilot ratings.

Medical Record Science

The University, in affiliation with several area hospitals, offers a three-year program leading to certification in Medical Records Science for students who already hold a bachelor's degree and wish to qualify for the professional examination leading to registration as a record librarian.

For Medical Technologists, Cytotechnologists, Hematologists

In cooperation with the New England Baptist and the New England Deaconess Hospitals, Northeastern University offers a full-time day program on the Cooperative Plan leading to the degree of Bachelor of Science.

Bachelor of Science degree programs in Medical Technology, Cytotechnology, and Hematology are offered on a part-time basis by University College in cooperation with several approved hospital schools.

For Nurses

Northeastern University offers instruction in the sciences, humanities, and social studies for student nurses from the New England Deaconess and Children's Hospital Medical Center Schools of Nursing.

Physician Assistant

In cooperation with the Massachusetts Medical Society, Northeastern offers an 18-month program for the primary care physician assistant. Clinical rotations, supplemental to courses taken on campus, take place at Boston-area hospitals.

For Radiologic Technologists

University College in collaboration with over 50 A.M.A. accredited Hospital Schools of Radiologic Technology located in the New England area conducts a program leading to certification as a registered Radiologic Technologist (R.T.) and the Associate in Science degree.

For Respiratory Therapists

This program is conducted by University College and the College of Pharmacy and Allied Health Professions in affiliation with local hospitals.

buildings and facilities

Location of Main Campus

The main campus of Northeastern University is located at 360 Huntington Avenue in the Back Bay section of Boston. Many of the city's famous cultural, educational, and philanthropic institutions are situated in the Back Bay, including the Museum of Fine Arts, Symphony Hall, Horticultural Hall, the Isabella Stewart Gardner Museum, the Harvard teaching hospitals, and many schools and colleges. Most are within walking distance of Northeastern University.

Major transportation facilities serving the Boston area are Logan International Airport, two rail terminals, bus terminals serving inter- and intra-state lines, and MBTA subway-bus service within the metropolitan-suburban area. There is a subway stop in front of the campus. For motorists, the best routes to the campus are the Massachusetts Turnpike (Exit 22) and Route 9, of which Huntington Avenue is the intown section.

The campus of 47 acres is divided by Huntington Avenue, with the main educational buildings on one side and dormitories on the other. The principal buildings, all of which have been constructed since 1938, are of glazed brick in contemporary classic style. Most are interconnected by underground passageways.

Carl S. Eli Student Center

The Carl S. Eli Student Center provides facilities for student recreation and for extracurricular activities. The Alumni Auditorium, with a seating capacity of 1,300, is part of the Center. Also included are special drama facilities, a ballroom, main lounge, fine arts exhibition area, student offices, conference rooms, and a dining area seating more than 1,000.

The University Library

The Dodge Library is the main library on the Boston campus and maintains an open-stack system. Bound volumes in the library system exceed 360,000, and microform titles, 267,000. Collections are located in these areas:

1. The General Collection in the book stacks as indicated by the classification number given in the upper left corner of the catalog card.

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2. The Reference Collection in the Cabot Reading Room to the left of the circulation desk, which includes bibliographies, maps, company publications, the pamphlet file, and association publications. Theses, under the supervision of the Reference Dept., housed in the basement and should be requested in the Reference Room.
3. The Periodical Collection in the Webster Reading Room to the right of the circulation desk, consisting of current periodicals, periodical indexes and abstracts, with 2 stack levels adjacent for back files of bound volumes. The Microfilm Collection in Room 108, adjacent to the Webster Reading Room.
4. The Reserve Book Collection on the second floor.
5. The Foreign Literature Collections in the Webster Reading Room to the right of the circulation desk.
6. The collections of fine arts, housed in the Richardson Room on the second floor. The audio facility for spoken and music recordings and magnetic tapes for instructional and individual use also located in this room.
7. The American and English Literature Collections in the Literature Reading Room.
8. Government documents maintained on the basement level.

There are also book catalogs of the collections in the library at Norwood Airport, Math/Psych Library, Chemistry Library, and in both the Documents and Reserve Book Rooms. There is an information desk in the Reserve Book Room to assist people in using the card catalog during the day.

The Circulation Dept. has a printed list of all materials charged out, which may be consulted by all users. To borrow materials, University identification must be presented. For extensive research, where the University Library does not have the material, application should be made to the Inter-Library Loan Librarian for materials needed from other libraries. Information service is available in this department in the evenings.

Library Hours — Boston Campus

Monday — Thursday	7:45 a.m. to 10:00 p.m.
Friday	7:45 a.m. to 7:30 p.m.
Saturday & Sunday	1:00 p.m. to 5:00 p.m.

The University Library System includes three graduate libraries in the Division of Research. Physics-electrical engineering is housed in 325 Dana Research Center. Mathematics-psychology is housed on the fifth floor of the United Realty Building and chemistry is located on the first floor of Hurtig Hall.

Library Hours — Suburban Campus, Burlington

Monday — Friday 8:30 a.m. to 9:00 p.m.

Cabot Physical Education Center

The Godfrey Lowell Cabot Physical Education Center is one of the best equipped in New England. It contains four basketball courts, an athletic cage, a women's gymnasium, and a rifle range, as well as administrative offices for the Department of Athletics and for the Physical Education Department of Boston-Bouvé College.

A recent addition to the center, the Barletta Natatorium, houses a 105-foot swimming pool, a practice tank for the crew, handball courts, and shower and dressing facilities.

Dockser Hall

Charles and Estelle Dockser Hall, completed in 1968, houses a large gymnasium, dance studio, motor performance laboratory, college library, community recreation laboratory, folk arts center, dark and music rooms, recreation resources area, locker rooms, offices, classrooms, conference room and lounge, storage facilities, and a research laboratory.

SUBURBAN FACILITIES

Suburban Campus

The Suburban Campus, located near the junction of Routes 128 and 3 in Burlington, Massachusetts, was established to meet the needs of individuals and of industry in the area.

In addition to graduate courses in engineering, physics, mathematics, business administration, science; education, and the arts, portions of undergraduate programs leading to the associate and bachelor's degrees, special programs for adults, and non-credit state-of-the-art programs are offered.

Henderson House

The University's conference center, Henderson House, is located in Weston, Massachusetts. The Center for Continuing Education conducts short-term courses, seminars, and special institutes for business, professional, and research groups. Henderson House is 12 miles from the main campus.

Warren Center

The Warren Center for Physical Education and Recreation in Ashland, Massachusetts, serves as a year-round outdoor laboratory for students in Boston-Bouvé College. There are facilities for conferences, special education in arts and crafts, and sports — including aquatics. Buildings include a lodge, cottages, and an infirmary.

Marine Science Institute

The Marine Science Institute at Nahant, Massachusetts, about 20 miles northeast of Boston, is a research and instruction facility primarily engaged in studies of marine biology and oceanography. The Institute is operated the year around.

lincoln college administration

Administrative Officers

William F. King, B.S., M.S., P.E.
Director

Jacob Wiren, B.S., M.S., P.E.
Assistant Director

Hollis S. Baird
Assistant to the Director

Otis F. Cushman, B.S., M.S.
Assistant Director

Student Counselling Staff

Hollis S. Baird
Administrative Coordinator

Robert J. Averill, B.S., M.S.
Philip W. Dunphy, B.S., M.Ed.
Charles F. Field, B.S., M.Ed.
George K. Howe, B.S., M.Ed.
Philip R. McCabe, B.S., Ed.M.

Roderic W. Sommers, B.S., M.Ed.
Richard E. Sprague, B.S., B.B.A.,
M.B.A., Ed.M.
Jacob Wiren, B.S., M.S., P.E.
Kenneth S. Woodward, B.S., M.S.

Committee on Regulations and Discipline

William F. King, *Chairman*

Hollis S. Baird
Kenneth S. Woodward
Kenneth C. Solano

Otis F. Cushman
Kenneth W. Ballou
President, Adult Student Council

Academic Standing Committee

Otis F. Cushman, *Chairman*

Hollis S. Baird
William F. King

Jacob Wiren
Kenneth S. Woodward

Academic Advisory Council

William F. King, *Chairman*
Jacob Wiren, *Vice Chairman*
Hollis S. Baird, *Secretary*

Leroy M. Cahoon
Otis F. Cushman
Edward M. Cook
Robert S. Lang

Ernest E. Mills
Louis J. Nardone
Thomas H. Wallace
Kenneth S. Woodward

Curriculum Advisory Committee

William F. King, B.S., M.S., P.E.
(Academic Administration)

Chairman

Jacob Wiren, B.S., M.S., P.E.

Vice Chairman

Otis F. Cushman, B.S., M.S.

Secretary

Professor Hollis S. Baird

Robert J. Averill, B.S., M.S.
(Circuit Theory)
Edward Bobroff, B.M.E., P.E. (Mass)
(Calculus)
Eugene G. Branca, S.B., S.M.
(Basic Mathematics)
Franklyn K. Brown, B.S., Ed.M.
(Engineering Design)
William O. Bruehl
(Mechanical Engineering
Laboratory)
Leroy M. Cahoon, B.S. in C.E., M.S.,
P.E. (Mass)
(Civil Engineering Technology)
John J. Cochrane, B.S., M.S., Ph.D.
P.E. (Mass, N.Y., Vt.)
(Environmental Technology)
Edward M. Cook, A.B., A.M.
(Mathematics)
Warren C. Dean, A.B., M.A.
(Differential Equations)
Paul A. Dunkerley, B.S., S.M.,
P.E. (Mass)
(Fluid Mechanics)
William D. Finan, A.B., M.A.
(Introductory Mathematics)
John L. Freedman, B.S., P.E. (Mass)
(Electronics)
David Goldberg, B.S., M.S.
(Electrical and Electronic
Graphics)
Arthur F. Gustus, B.S., Ed.M.
(Physics)
Francis R. Hankard, B.S., M.A.
(Physics)
Joseph J. Hansen, A.B., M.B.A.
(Mathematics for Business
Management)
George C. Harrison
(Pulse Circuits & Elect. Labs.)

John Kaczorowski, Jr., B.S., M.S.
(Electrical Power Engineering
Technology)
Gary M. Keighley, B.S.
(Flight School)
George F. Kent, B.S., M.S.,
P.E. (Mass)
(Materials)
Horatio W. Lamson, B.S., M.A.,
P.E. (Mass)
(Electrical Measurements)
Robert S. Lang, B.S., Ed.M.
(Graphics and Computation)
Demetre P. Ligor, B.S.E.E., P.E.
(Mass) (Wave Phenomena,
Semiconductor Physics & Devices)
Walter Messcher, B.M.E., M.S.
(Computer Programming)
Ernest E. Mills, B.S., M.S., P.E.
(Mass) (Mechanical Engineering
Technology, Day and Evening)
Louis J. Nardone, B.S., M.S.,
P.E. (Mass)
(Electrical Engineering
Technology, Day and Evening)
Bernard C. Reddy, B.S., Ed.M.
(Introductory Physics)
Harold M. Sharaf, B.S., M.S.
(Principles of Communication
Systems)
Thomas H. Wallace, B.S., M.A., Ph.D.
(Physics)
Willard B. Whittemore, B.S., in C.E.,
Ed.M., C.A.G.S.
(Algebra and Trigonometry)
Albert G. Wilson, Jr., B.S. in C.E.,
M.S., P.E. (Mass), S.E. (Illinois)
(Statics and Dynamics)
Kenneth S. Woodard, B.S., M.S.
(Aviation Technology)

Office Staff

Rasma Galins, Administrative Secretary
Mary L. Tangney, Secretary
Doris S. Tortora, Secretary
Rebecca Silverman, Secretary of Records

the role and scope of lincoln college

Purpose

Lincoln College is charged with the responsibility for developing and offering college-level courses and curricula of an applied-science or technological nature. Its purpose is to assist professional personnel, qualified to deal with the applications and uses of the biological, natural, and physical sciences, in better meeting community needs. The programs of study conducted by the College have in common the following purposes and characteristics:

1. The programs of instruction prepare the graduate for activities allied to the fields of engineering, science, or medicine, but are more specialized than those required to prepare a person for full professional responsibilities.
2. The programs of instruction are more concise and more completely technological in content than professional curricula, though they are concerned with the same general fields of scientific, engineering, industrial, or clinical specialization.
3. The programs of instruction are based upon principles of science, and include post-secondary-school mathematics to provide the tools to achieve the technological objectives of the curricula.
4. Emphasis is placed upon the use of rational processes in converting theories and ideas into practical techniques, procedures, and products.
5. Extensive training for artisanship or craftsmanship is not included within the scope of the technological education programs.
6. Graduates from the associate degree programs have opportunities for educational work leading to the Bachelor of Engineering Technology and Bachelor of Science degrees.

Technology and the Technologist

Scientific and technological skills range over a very broad spectrum extending all the way from extremely simple craftsmanlike activity

to highly complex and abstract activity. At one end of the spectrum is the professional whose work is mostly theoretical in character. He studies, reasons, and visualizes how new knowledge may be used in the development of solutions to technical problems. Usually he is not completely knowledgeable of the detailed procedures used by the skilled craftsman who executes the ideas, procedures, and designs.

The technologist is the pivot-man on the professional-technologist-craftsman team. He works with the professional engineer, scientist, doctor, supervisor, and craftsman in converting knowledge of scientific theories and practical craftsmanship into products, procedures, and techniques. His responsibilities are technologically important — professional opportunities are limited only by ambition, ability, and education.

When employed in research, design, or development, the technologist usually acts as direct supporting personnel to the professionals. If he functions in a capacity related to production, operation, testing or control, he usually follows a course prescribed by a professional but may not work closely under his direction. If installation, maintenance, or sales are his areas of responsibility, he is frequently performing a task that would otherwise have to be performed by the professional. He thereby assumes the more routine professional functions demanded by our increasingly scientific and technical society.

In executing his functions, the technologist is required to use a high degree of rational thinking, to employ post-secondary school mathematics and the principles of the biological, natural, and physical sciences. The skilled technologist works with his mind as well as his hands. He considers why things work as well as how things work. To perform his functions efficiently, the technologist must effectively communicate technical and scientific information mathematically, graphically, and linguistically.

The Need for Technologists

Our present technological age, with its exploding accumulation of new information and discoveries in the physical, natural, and life sciences, has increased the need for people with specialized training in science and technology. Experts have recently estimated that in order to meet expanding needs, the number of students graduating from the nation's professional schools must double — a goal which is improbable in the near future.

The most reasonable alternative is to make our professional manpower most efficient by providing assistance in the form of specially trained technologists. Manpower experts believe that the present ratio of less than one technologist to each professional should ideally be nearer five to one.

Opportunities for technologists are increasing at a faster rate than for any other occupational group — a 50 per cent increase is expected in the next five years. More than 200,000 technologists will be needed each year, whereas schools now graduate only 50,000 per year. The tech-

nologist's employment opportunities are varied and much demanded in health and public service organizations; atomic energy and electric power industries; metal fabricating industries; local, state, and federal government agencies; the armed forces; aerospace industries; chemical, petroleum, plastics, and metal industries, as well as transportation and communication industries.

PROGRAMS OF INSTRUCTION

Recognizing the growing need for technicians and technologists and their expanding role in modern society, Lincoln College offers Pre-Technology Preparatory Courses and degree programs leading to the Associate in Engineering (A.E.); Associate in Science (A.S.); and Bachelor of Engineering Technology (B.E.T.) as follows:

Pre-Technology

Introductory Mathematics, Basic Mathematics, Physics, and English	pages 58-59
Reading-Improvement Program (non-credit)	page 59
Programmed Instruction Review Courses (non-credit)	page 60

Aviation Technology

Aviation Technology (A.S. degree) — 2 years days	page 63
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Civil Engineering Technology

Architectural Engineering Technology (A.E. degree)	page 66
Environmental Engineering (A.E. degree)	page 67
Structural Engineering Technology (A.E. degree)	page 69
Surveying and Highway Engineering Technology (A.E. degree)	page 70
Civil Engineering Technology (B.E.T. degree)	pages 71-72

Electrical Engineering Technology

Electrical Power Engineering Technology (A.E. degree)	page 74
Electronics Engineering Technology (A.E. degree)	page 75
Electrical Engineering Technology (B.E.T. degree)	pages 76-78
Electrical Engineering Technology (B.E.T. degree) (Day Cooperative Curriculum)	pages 79-80

Mechanical Engineering Technology

Mechanical Engineering Technology (A.E. degree)	page 82
Heat Engineering Technology (A.E. degree)	page 83
Mechanical Engineering Technology (B.E.T. degree)	pages 84-85
Mechanical Engineering Technology (B.E.T. degree) (Day Cooperative Curriculum)	pages 86-87

Interdisciplinary Science and Engineering Technology Programs

Chemical-Physical Technology (A.S. degree)	page 89
Mathematical-Physical Technology (A.S. degree)	page 90
Fire Technology (A.S. degree)	page 91
Bioelectronic Engineering Technology (A.E. degree)	page 92
Computer Engineering Technology (A.E. degree)	page 93
Control Systems Engineering Technology (Certificate)	page 94
Environmental Control Technology (B.E.T. degree)	page 95-96
Mechanical-Structural Engineering (B.E.T. degree)	page 97

admissions information

ADMISSION

The Student Body

The student body of Lincoln College is composed of recent high school graduates and mature men and women. Most students are employed in industry with vocational experience ranging from very little for the recent secondary school graduate to as much as 20 or 30 years for individuals seeking increased professional responsibility and status. Many technical career categories are represented — industrial, engineering, scientific, and allied-medical — demonstrating that, in our increasingly complex society, the key to personal advancement is education.

Academic Background

A firm knowledge of the fundamentals of mathematics and science is the foundation upon which successful achievements in the more advanced technological courses are built.

Applicants to Lincoln College are, in many cases, mature adults who, although they have experience in industry or previous education, have been away from formal study for some time and, therefore, have doubts concerning their study habits and their algebra, geometry, and science proficiency. Those who anticipate some difficulty in adjusting to the first-year course requirements are advised to give very serious consideration to enrolling in non-credit courses in introductory mathematics, introductory physics, and/or introductory chemistry. These courses are designed to develop adequate background for the basic courses in the degree programs.

Program Counseling

Career planning through self-analysis and professional counseling assists students in planning educational programs appropriate to their objectives. Entering students are encouraged to arrange for personal interviews with Lincoln College program counselors for assistance in planning their academic programs. Counselors are available by appointment

at the Huntington Avenue Campus, Boston; the Suburban Campus; Burlington; the North High School, Framingham; the Weymouth North High School, Weymouth; the Norwood Junior High School North, Norwood; Norwood Airport, Norwood; and the Lynn English High School, Lynn. Students are encouraged to present records of prior education whenever possible. The effectiveness of the counseling review is greatly enhanced by this information. The University, through its Counseling and Testing Center and its Career Information Center, is also prepared to assist applicants whose educational and vocational goals are more complex or less firmly defined.

Application for Admission

Applications for the programs of study offered in the Lincoln College are accepted for admission to the Fall (September), Winter (January), Spring (March), and Summer (June) Quarters. Applications should be filed as early as possible in advance of the opening of the quarter for which the student desires to register in order that eligibility and status may be established.

Information concerning admission may be obtained either by writing to Lincoln College or by requesting it at the time of visiting the College. The application for admission should be completed in detail and submitted to Lincoln College, Northeastern University, Boston, Massachusetts 02115.

All inquiries relative to the Day Cooperative programs should be referred to the Day College Admissions office 150 Richards Hall. See pages 79-80 and 86-87.

Mathematics Placement Test

Applicants requesting admission to regular first-year mathematics are required to demonstrate proficiency in introductory or basic mathematics through the Lincoln College Mathematics Placement Test. Students who request enrollment in the non-credit Introductory Mathematics course are not required to take the test. The Mathematics Placement Test will be administered during the registration period for each term of instruction at the Huntington Avenue Campus, Boston; the Suburban Campus, Burlington. The Mathematics Placement Test will be administered on selected dates at the North High School, Framingham; the Weymouth High School, Weymouth; the Lynn English High School, Lynn; and the Norwood Junior High School North, Norwood. In addition, the test is administered during the summer months. Contact the Lincoln College Office, 219 Hayden Hall, at the Boston Campus (437-2500).

Students who demonstrate satisfactory proficiency in the test will be permitted to register for the first-year courses in the program of their choice. To enroll in Engineering Physics (11.317) the student may need to take Introductory Physics.

If need for a strengthening of mathematical background is indicated, the applicant will be assigned to the Introductory Mathematics course.

Students enrolling in Introductory Mathematics may fill out their schedule by enrolling in Introductory Physics, Introductory Chemistry, or Engineering Graphics.

In every case the student should carefully consider his combined work and study load and register only for those courses which contribute to the development of a firm knowledge of fundamentals and which enable him to adjust to academic study requirements.

CLASSIFICATION OF STUDENTS

Applicants who have filed an Application for Admission and who are approved by the Lincoln College Academic Standing Committee are admitted as regular degree candidate students in the program which they have indicated on the application.

Special Students

Students having specific course needs, who do not desire a degree, may register for the courses if they have the required prerequisites or their equivalent. These students will be enrolled as "special students."

Matriculation

Degree candidates must file a petition for matriculation when they have completed a minimum of forty quarter-hours of work in Lincoln College for a review of their academic record and to insure that:

1. The student is entered in the permanent record as a degree candidate in the program of his choice.
2. Advance standing credit for transfer students is entered in their permanent record.

This review will assure that the student has:

1. Attained a satisfactory quality point average.
2. Presented evidence of completion of an accredited secondary school program by submission of a transcript of record or a high school equivalency certificate.
3. Demonstrated acceptable levels of ability and achievement in 15 units* of secondary school and/or collegiate work as follows:

Verbal Communication	4 units
Mathematics and Computation	3 units
Science and Technology	3 units
Other	5 units

4. The Academic Standing Committee may require a student to take one or more aptitude or interest tests if his credentials or academic record fail to completely satisfy the criteria for probable academic success. These tests will be administered by the University Counselling and Testing Center. A fee is charged for these tests.

*A unit represents a year's work in a subject at an approved secondary school, community college, junior college, technical institute, or university.

TRANSFER STUDENTS AND ADVANCED STANDING CREDITS

Students transferring from community colleges, junior colleges, technical institutes, or other colleges and universities may transfer applicable credits toward the degree requirements of Lincoln College.

Students admitted with transfer or advanced standing credits from another institution must meet the requirements for admission as set forth under the regulations applicable to regular students. Advanced standing in the Lincoln College may be obtained by (1) Transfer of Credits or (2) Proficiency Examination.

Transfer of Credits

Subject to the approval of the Academic Standing Committee credits may be awarded for academic work completed in other approved schools, colleges, or universities if the following criteria are met: (a) the content of the course being submitted is equivalent to that of the corresponding course in the Lincoln College; (b) the average grade achieved in the course submitted is "C" or higher, and (c) the remoteness of the time of study does not negate its use as a prerequisite for an advanced course.

Applicants desiring advanced standing credit by transfer should indicate this desire at the time of filing the application for admission. The applicant should request the Registrar of the institutions of previous attendance to mail an official transcript to the Lincoln College Office.

Proficiency Examinations

Applicants who do not meet all the criteria for the normal transfer of credits, but who are able to supply evidence of sufficient knowledge of a subject as a result of previous training or experience, may petition the Academic Standing Committee for the privilege of taking a Proficiency Examination. If satisfactory proficiency is indicated by the examination, advanced standing credits may be awarded or a substitute course may be recommended.

Readmission

Former students, who seek readmission to continue a program of study after having withdrawn from the College for a period of time, may be required to repeat courses which are prerequisites to advanced work.

REGISTRATION

Registration for Courses

Completion of admission requirements does not constitute official registration for courses. All students must be properly registered before attending classes. Registrations are processed by the Registrar's Office during the official registration periods. Former students should ascertain completion of prerequisite courses before registration. Students may register for full-year sequences of courses during the official registration periods. They are urged to register as early as possible in order to obtain the desired class schedule.

Changes in Registration

Changes in program should be initiated before the opening day of classes during the official registration periods.

Official Registration Periods

Official registration periods are scheduled before the Fall, Winter, Spring, and Summer Quarters during the academic year. Students are urged to register as early as possible during these periods. Dates of registration periods for each quarter are listed in the official 1974-1975 Academic Calendar (See pages 6 and 7).

Withdrawal

Simply ceasing to attend classes or notifying the instructor does not constitute official withdrawal from a course. To withdraw officially from a course, the student must notify the Registrar's Office in writing or complete the appropriate withdrawal form. Properly registered students who do not attend one of the first three sessions in any course will be automatically withdrawn from the class roll.

Courses in Other Departments of the University

Lincoln College students assigned to courses in other departments of the University are charged the tuition rates and other fees effective in the departments in which they are enrolled.

academic information

ACADEMIC OPERATIONS

Campuses and Extensions

All courses are offered at the Huntington Avenue Campus, Boston, with some courses available at the Suburban Campus or Wyman Jr. High School, Burlington; and at North High School, Framingham; English High School, Lynn; North High School, Weymouth; Norwood Junior High School North, Norwood; and for Aviation Technology students at the Norwood Airport, Norwood.

The Quarter Calendar

The regular school year, from September to June, is divided into three quarters of 13 weeks each. Twelve weeks are scheduled for instruction and final examinations with one week available for make-up classes or vacation time. A limited program of courses is offered during the summer quarter.

Class Sessions

At the Huntington Avenue Campus, lecture periods consist of one hour and forty-minute sessions beginning at 4:10 p.m., 6:00 p.m., and 7:50 p.m. each weekday and at 9:00 a.m. or 10:50 a.m. on Saturdays. At the Suburban Campus and Wyman Junior High School, Burlington, lecture periods will begin at 4:10 p.m., 6:00 p.m., and 7:50 p.m. At the North High School, Framingham, lecture periods will begin at 6:15 p.m. and 7:55 p.m. At the North High School, Weymouth; Lynn English High School, Lynn; Haverhill High School, Haverhill; Norwood Junior High School North, Norwood; and Norwood Airport, Norwood; lecture periods will begin at 6:00 or 7:50 o'clock each evening. Day sessions at Norwood Airport begin at 8 o'clock each morning. Design and laboratory courses are of longer duration and may occupy a full evening. All laboratory courses are conducted on the Huntington Avenue Campus.

Course Work

All of the usual methods of instruction are employed — lectures, home assignments, class projects, laboratory work, irregularly scheduled quizzes, and formal examinations. In addition, mid-course examinations are scheduled in most courses and a final examination is required at the completion of all courses. Students are responsible for fulfilling all the requirements of a course. In the event of absence, students must make appropriate arrangements for makeup with the instructor. Students must follow the procedures outlined below for makeup of missed mid-term or final examinations.

Student Study Areas

The UNIVERSITY LIBRARY is well equipped with technical literature. A detailed statement about its facilities and hours appears on pages 24 and 25.

The privilege of obtaining books from the Boston Public Library is extended to students of Lincoln College. Application for this privilege, which involves a fee, should be made directly to the Boston Public Library.

Additional study areas are available in the Ell Student Center Building.

Attendance

Students absent from regularly scheduled sessions in any subject, for whatever reason, may seriously jeopardize their academic progress and status. Students are expected to be in attendance at all the sessions scheduled in their courses. Excessive absence may be sufficient cause for the Registrar to remove the subject(s) from the student's schedule.

Withdrawal

Simply ceasing to attend classes or notifying the instructor does not constitute official withdrawal from a course. To withdraw officially from a course, the student must notify the Registrar's Office or complete the appropriate withdrawal form.

The Registrar will withdraw the student from a course who:

1. Does not attend one of the first three classes at the beginning of a 12 week quarter.
2. Does not attend one of the first two classes at the beginning of a summer term.

MAKEUP EXAMINATIONS**Mid-course Examinations**

A student absent from a regularly scheduled mid-course examination or quiz may request permission to take a makeup examination. This is a privilege which may be denied if abused by an excessive number of petitions or for other reasons.

Students applying for makeup examinations must:

1. Request from the instructor permission to take the midterm examination or quiz.
2. The instructor will forward the examination to the Lincoln College Office for processing.

Makeup mid-term examinations and quizzes will be given on a Saturday at 9:00 a.m. in a designated room at the Huntington Avenue Campus according to the following schedule:

Examination Missed During	Date Scheduled
Fall Quarter	Nov. 30, 1974
Winter Quarter	March 8, 1975
Spring Quarter	June 7, 1975
Summer Terms	In course

Any student who does not take the makeup examination as scheduled will forfeit the makeup privilege.

Missed Final Examinations

If a student is absent from a final examination, he will receive a grade of "I" (Incomplete) in the course. He may petition for a makeup final examination at the Registrar's Office, 120 Hayden Hall.

A student does not automatically have the right to make up a missed final examination. Students must petition for this privilege. If the petition is granted, the student must pay a fee of \$5.00 for taking the special final examination. Petitions may be obtained from the Registrar's Office or in each off-campus Administration Office. Petitions for missed finals must be filed in accordance with the schedule listed below:

Final Examination Missed During	File Petition No Later Than	Date Scheduled
Fall Quarter	January 18, 1975	February 8, 1975
Winter Quarter	April 19, 1975	May 17, 1975
Spring Quarter	July 12, 1975	August 16, 1975
Summer Quarter	October 4, 1975	November 1, 1975

Students will be notified by mail when and where to take the missed final examination. All examinations will be administered on the Boston Campus. Those who do not take makeup final examinations as scheduled forfeit the makeup privilege.

ACADEMIC STANDARDS

The student is required to maintain appropriate levels of academic achievement in terms of grades, quality-point average, and the quantitative credit requirements of his program of study to satisfy academic progress criteria and achieve graduation from Lincoln College.

Grading System

The following system of grading is used. The numerical equivalent for each grade is in parentheses.

A (4.0) — Outstanding	L Audit (No Credit)
B (3.0) — Good	S — Satisfactory (Pass-Fail grade)
C (2.0) — Satisfactory	U — Unsatisfactory (Pass-Fail grade)
D (1.0) — Poor	X — Incomplete (Pass-Fail grade)
F (0.0) — Failure	* Grade not received
I (—) — Incomplete	

A general average of "D" is unacceptable and will not allow a student to continue in Lincoln College or to receive a degree from Northeastern University. The "F" grade is a definite failure. The standard procedure for clearing failures in courses offered in Lincoln College is to repeat the course. In some instances circumstances may warrant amending the standard procedure. These circumstances are described in the *Student Handbook* for day students. An I or X (incomplete) grade is used for a temporary grade to show that the student has not completed the course requirements.

Pass-Fail Courses

Any student who is not on academic probation and who has completed 40 quarter hours of academic work may register for one pass/fail course and, thereafter, for one course on a pass/fail basis for each 10 quarter hours of successfully completed work. Written permission of the appropriate academic dean must be obtained for each pass/fail course. At no time may a student register for more than one pass/fail course per quarter.

Such courses will be restricted to free electives outside the major field of specialization, so that no part of the specifically prescribed curricula will be affected.

The grades recorded on the basis of the pass/fail system of grading will not figure in the computation of the QRA.

Auditing Policy

Students are permitted to audit courses upon filing the usual registration forms and paying the regular tuition fees. There is no reduction in fees for auditing. An auditor may participate in class discussion, complete papers and projects and take tests and examinations for informal evaluation, if desired. However, regardless of the amount or quality of work completed, **no academic credit will be granted at any time for courses audited.**

Audit Procedure

The student's decision to take a course on an audit basis must be communicated in writing to the Registrar prior to the fourth class meeting of the course. No exception to this procedure can be approved without authorization by the Academic Standing Committee of the College.

Grade Reports

Grades are mailed to the student by the Registrar and will not be given out at the office of either the Registrar or Lincoln College. Under no circumstances will grades be given over the telephone.

Quality-Point Average

The quality points earned by the student in a given course are determined on the basis of the letter-grade achieved and the number of credit hours carried by the course. The total quality points earned divided by the total number of credit hours constitute the quality-point average.

- 1. When the student has more than one grade in the same course, the most recent grade will be used in the calculation of the quality-point average.
- 2. A grade of "I" will not be considered in the calculation of the final quality-point average.
- 3. Although advanced standing credits (ASC) allowed for acceptable work completed at other institutions by transfer students count toward completion of the quantitative credit requirements, neither the credits nor the grades earned in such courses are included in quality-point average computations.
- 4. In programs made up of combined U.C. and L.C. courses, the cumulative quality-point average will include all work in both colleges.

For example, a student who has registered for seven courses, cleared a failure in one of them and received advanced standing credit (ASC) in another, may calculate his quality-point average as follows:

Grade Achieved	Numerical Equivalent	Credit Hours	Quality Points
A	4.0	× 4 =	16.0
B	3.0	× 4 =	12.0
C	2.0	× 3 =	6.0
D	1.0	× 3 =	3.0
F	0.0	× 2 =	0.0
FB	3.0	× 2 =	6.0
I	—	× — =	—
IC	2.0	× 2 =	4.0
ASC	—	× — =	—
		Totals	20 47.0

Quality-Point Average = $\frac{\text{Total Quality Points (47.0)}}{\text{Total Credit Hours (20)}} = 2.350$

The Registrar's Office will not be able to recalculate or confirm the calculations of quality point averages for individual students. Each student's record will be brought up to date before his graduation. In the meantime, borderline cases will be checked by the Lincoln College Academic Standing Committee.

Academic Progress Criteria

It is expected that the student will at all times endeavor to achieve a high record of achievement. The Academic Standing Committee reserves the right to review all students' records and deny readmission to those who fall below a minimum quality level of achievement. This requirement has been established as follows:

In order to be allowed to remain in the College, a student must have achieved a quality-point average of 1.4 at the completion of 24 quarter

hours; 1.5 at the end of 48 quarter hours; and 1.6 at the end of 72 quarter hours.

It should be further noted that a student who accumulates the equivalent of six uncleared failures may be considered ineligible to continue his program of study.

Scholastic Probation

The Academic Standing Committee has the authority to dismiss from the College or place on scholastic probation any student whose scholarship is deficient for the following reasons: low quality-point average, excessive outstanding failures regardless of quality-point average.

A student on scholastic probation should be particularly diligent in his current courses and make every effort to clear his academic deficiencies as soon as possible. Students whose academic record does not improve or whose failures are not properly cleared may not be allowed to register for further courses.

When a student on scholastic probation has cleared all or a substantial part of his outstanding failures he may petition the Academic Standing Committee for removal from the probation list.

Disciplinary Probation

The Academic Standing Committee has the authority to dismiss from the College or place on disciplinary probation any student whom it may deem unworthy because of conduct or character. The Committee may ask any student to withdraw from the College who is obviously out of sympathy with its aims and ideals.

GRADUATION REQUIREMENTS

To receive the degree of Associate in Engineering, Associate in Science, Bachelor of Engineering Technology, the student must fulfill the following requirements:

1. Must have been formally accepted into "degree candidate" status by the Committee on Admissions.
2. Complete all the courses of his particular curriculum, either by attendance at the Lincoln College or by receiving Advanced Standing Credit.
3. Complete associate degree programs in eight years and bachelor's programs in 12 years from the date of entrance into Lincoln College. Extensions of time may be granted by the Academic Standing Committee.
4. Be in attendance for at least a year preceding the date on which he expects to graduate; and he must complete at least one fourth of his work in Lincoln College.

5. Achieve a quality-point average of at least 1.75 in courses taken in the College to be awarded the Associate in Engineering or Associate in Science degrees and 1.80 for the Bachelor of Engineering Technology degree.
6. Pay the Graduation Fee of \$25.

In addition students:

7. May not earn two associate degrees or two bachelor's degrees in the same field of academic specialization.
8. Must complete a minimum of 30 quarter hours of additional credits to be awarded more than one associate or bachelor's degree.
9. May not be awarded the associate and bachelor's degree at the same commencement.
10. Must petition for transfer of credits completed at other institutions prior to January 1 of the year in which the degree is to be awarded.

ACADEMIC AND PROFESSIONAL AWARDS

The academic programs offered by the Lincoln College and the teaching, counselling, and professional efforts of the faculty and staff are aimed at motivating the student toward the highest possible levels of academic achievement. To encourage scholarly and professional excellence and to recognize quality achievements, the following awards are made at appropriate times during the academic year:

Honor List and Dean's List Scholars

Students maintaining honor grade averages — minimum quality average of 3.000 and no "D" grades — during a quarter while carrying a minimum of 6 quarter hours credit are recognized as Dean's List Scholars. Students desiring certificates attesting to this honor should request them from the Lincoln College Office.

Scholastic Achievement Certificates

Upon graduation with an associate degree, Scholastic Achievement Certificates will be awarded to those students who have achieved distinctly superior attainment in the academic work as follows:

Scholastic Achievement	3.000-3.499 Q.P.A.
High Scholastic Achievement	3.500-3.749 Q.P.A.
Highest Scholastic Achievement	3.750-4.000 Q.P.A.

In order to be eligible for a Scholastic Achievement Certificate the student must earn a minimum of 48 quarter hours of credit in Lincoln College.

Graduation with Honor

Upon graduation, honors will be conferred upon students who have achieved distinctly superior academic achievement in a program leading to the Baccalaureate Degree as follows:

Honor	3.000-3.499 Q.P.A.
High Honor	3.500-3.749 Q.P.A.
Highest Honor	3.750-4.000 Q.P.A.

In order to be eligible for Honors the student must earn a minimum of 72 quarter hours credit in Lincoln College and receive a vote of approval from the faculty with responsibility for his program:

University Awards

The University Awards are presented annually to seniors pursuing associate degree programs, who have achieved high ranking cumulative academic records. The tuition scholarship awards are accompanied by an appropriate certificate.

Lincoln College Faculty Scholarship Award

The faculty encourages the achievement of scholarship by making monetary awards.

The Faculty Scholarship Fund was established in 1969 by voluntary contributions of the Lincoln College Faculty.

The Scholarship Committee determines the number and size of awards based on available funds.

The basis of the award is determined by need, academic achievement and personal qualifications. The Scholarship Committee invites applications by announcing the specific requirements of eligibility during the school year.

Technology Awards

The Technology Awards are presented annually to seniors, pursuing associate degree programs, who have demonstrated superior academic and professional capabilities in their special career fields. The scholarship awards and appropriate certificates are distributed to outstanding students enrolled in the following program categories:

- Civil Engineering Technology
- Commercial Aviation Technology
- Computer Engineering Technology
- Electrical Engineering Technology
- Mechanical Engineering Technology
- Science Technology
- Fire Technology

Class Marshal Award

The Class Marshal Award is presented annually, at the Class Day Banquet for Graduates, to the top ranking senior in a baccalaureate program. The award consists of an appropriate certificate, a selection of books, and the President's Letter of Commendation.

Sigma Epsilon Rho Awards

Sigma Epsilon Rho, the evening colleges scholastic honor fraternity, annually awards plaques and scholarships for outstanding scholastic achievement to the highest ranking students in University and Lincoln Colleges at the end of their junior year.

Sigma Epsilon Rho Honor Society Scholarship Award

The Sigma Epsilon Rho Honor Society Scholarship Award, established in 1974 by the membership of the Society, is awarded annually to an undergraduate student of University and/or Lincoln College at Northeastern University. Eligible students must have a cumulative Quality Point Average of 3.0 or better after completing 80 percent or more of their required studies.

Alumni Award for Professional Promise

Established in 1947 by the Northeastern University Alumni Association, the Alumni Award for Professional Promise is presented annually at a final senior class meeting in the spring of the year. The award is made to the senior who has demonstrated unusual professional promise through character traits, scholastic achievement, and work performance.

E. W. Wiggins Aviation Awards

The E. W. Wiggins Aviation Awards provide scholarship aid to students, enrolled in the Commercial Aviation Technology Program, who, in the judgement of the Northeastern University-Wiggins Airways Advisory Committee, have demonstrated the highest degree of proficiency in flying and related courses during the academic year.

Leslie B. Cutler Aviation Awards

The Leslie B. Cutler Aviation Awards were established by the members of the Aero Club of New England to honor and give recognition to the late Senator Cutler's service and devotion to the interests of aviation in the Massachusetts General Court, national legislative bodies, and her private life. These scholarship awards are made to students in the Commercial Aviation Technology Program who most typify the same interest, devotion, and leadership demonstrated by Senator Cutler during her long and distinguished public career.

financial information

TUITION

Initial Registration Fee

A ten dollar (\$10.00) registration fee, required of all new students, is due and payable upon registration. This fee is nonrefundable.

Tuition

Tuition for all part-time evening courses is \$32.00 per quarter hour of credit. Tuition for Day BET students will be based on the current day school rate. Charges for registration and tuition for special courses are at the rate specified for each course. Students are permitted to audit courses; however, there is no reduction in fees for auditing.

Students are not permitted to attend class sessions or take any examination or test until they have paid their tuition fees or have made satisfactory arrangements for payment.

Students will not be advanced in class standing, nor permitted to re-enroll in the University, nor will degrees be conferred, until all financial obligations to the University have been met.

No certificate of honorable dismissal will be issued to any student who has not fully met his financial obligations to the University.

Non-credit courses are charged at quarter hour rates equal to those of credit courses meeting on an equivalent contact-hour schedule.

Aviation Technology Tuition (Day Program)

FIRST YEAR	(All Students)	
Quarter 1	Quarter 2	Quarter 3
\$1090	\$965	\$913
Summer	(Flight Option)	
Quarter 4		
\$912		
SECOND YEAR	(Flight Option)	
Quarter 5	Quarter 6	Quarter 7
\$904	\$884	\$916
SECOND YEAR	(Non-Flight Option)	
Quarter 5	Quarter 6	Quarter 7
\$512	\$512	\$512

Tuition Deposit

Applicants accepted for admission to the day program must upon request pay a non-returnable tuition deposit of one hundred dollars (\$100) as evidence of their intention to enroll, and this will be applied on their first tuition payment.

Additional Flight Courses

Certified Flight Instructor	\$ 471	\$ 499
Instrument Flight	\$565	\$ 565
Helicopter Flight	\$1080	\$1080

(These rates cannot be guaranteed beyond the current academic year.)

Additional Time: Students requiring additional time beyond the prescribed course limits shall be charged for such time at the regular Wiggins-Northeastern rates.

Flight Tests: Flight tests are not included in the regular course curriculum. Charges will be made for the Commercial Flight Test and the Instrument Flight Test on the basis of 1½ hours of aircraft and 1½ hours of ground time at the regular Wiggins-Northeastern rate. The Instructor Flight Test which must be given by a regular FAA Examiner requires 1½ hours of aircraft time only.

Tuition for all courses is charged on a quarter basis and is payable in full at the beginning of each quarter. As a convenience without additional charge, and at the student's request, the Bursar's Office will allow payment in two installments.

Deferred-Payment Privilege

Occasionally situations develop, usually beyond the control of the student, which make it difficult to meet payments in the regular manner. Under such circumstances the student is advised to discuss his problem personally with the Bursar's Office where a convenient deferred payment agreement can be worked out. A service fee of \$2 is charged for this privilege.

Late Payment Fee

Payments of tuition are due by Saturday of the week in which the bill is dated. If payment, or a deferred payment agreement is not arranged by that date, a late fee of \$10 is charged by the Bursar.

Refund of Tuition

The general policy in all schools and colleges of the University with respect to refunds of tuition to students is as follows:

The University provides all instruction on an academic quarter basis for which students pay at the beginning of each quarter. Tuition refunds will be granted through the first four weeks of a quarter only when specific conditions are met. Questions regarding refunds should be discussed with the Bursar.

Tuition refunds will be granted only on the basis of the date appearing on the official withdrawal application when filed with the Registrar in Room 120 Hayden Hall. Non-attendance does not constitute official withdrawal.

Refunds will be granted in accordance with the following schedule:

official withdrawal filed within:	percentage of tuition
1st week of quarter	100%
2nd week of quarter	75%
3rd week of quarter	50%
4th week of quarter	25%

Tuition Underwritten by Employers

An increasing number of companies are underwriting part or all of the cost of tuition of students in their employ. In cases in which payment is made directly by the employer to the University, the student should furnish the Bursar's Office a purchase order covering his registration or a statement from an officer of his company certifying that the company is underwriting the tuition.

Student Bursar

All inquiries about student accounts should be directed to the Student Account Bursar, 437-2270.

Veterans Benefits

Veterans benefits depend on course load and increase sharply when a student's program exceeds 8 quarter hours per quarter. Questions and applications should be directed to room 245 RI.

SPECIAL FEES

Student Center Fee

Students attending the Huntington Avenue Campus, Boston, in the evening in a part-time program of study will be assessed a Student Center Fee of 75¢ per quarter.

Health Service Fee

Students attending the Boston, full-time Day Co-op B.E.T. programs are required to pay a Health Service Fee of \$90.00. The program is available to Aviation Technology Students on an optional basis.

Missed Final Examination Fee

Students absent from the regularly scheduled final examination at the end of a course may petition for a "special final examination." The fee for each examination requested by the student is \$5. The fee must be paid when the petition is filed in the University Registrar's Office.

Proficiency Examination Fee

Applicants for admission may petition to be awarded advanced standing on the basis of achievement demonstrated by a "proficiency examina-

tion." The fee for each examination requested by the applicant is \$10. The fee must be paid when the petition is filed in the Lincoln College Office.

Graduation Fee

The University graduation fee, charged to those who are candidates for the associate or bachelor's degree, is \$25, payable on or before May 1 of the year in which the student expects to graduate.

Transcript of Record Fee

Students may request transcripts of their records at the University Registrar's Office. There is no charge for the first transcript. After the initial transcript there is a charge of \$1 per copy, payable in advance. If more than one transcript is requested at one time the charge is \$1 for the first copy and 50¢ for each additional copy.

TEXTBOOKS AND SUPPLIES

Students purchase their own textbooks and work materials. The cost varies according to the subject for which the student is enrolled. The average cost for a normal program of four subjects generally ranges from \$25 to \$50. Textbooks for single courses range from \$4 to \$15.

Students enrolled in Engineering Graphics should be prepared to spend \$10 to \$15 for drawing supplies and \$10 to \$20 for a set of drawing instruments in addition to the textbooks.

LOAN PROGRAMS

Full-time students in Lincoln College who are pursuing the B.E.T. Program should refer to the Undergraduate Catalog for financial aid information.

National Direct Student Loan

This program is available to students who are carrying at least one-half the normal academic workload, are accepted as degree candidates, and who show evidence of financial need.

The Federal maximum a graduate student may borrow is \$5,000 while pursuing their post-baccalaureate degree.

Repayment and interest on these loans do not begin until nine months after the student ceases to carry at least a half-time academic load at an institution of higher education. The repayment of principal may be extended over a ten-year period with the interest at the rate of 3% per annum. Repayment may be deferred up to a total of three years while a borrower is serving as a Peace Corps or VISTA volunteer.

Community Sources

Students and their families are urged to explore community, industrial, and foundation sources for collegiate financial aid. Parental employers or the appropriate union organization may be a source. In addition, local,

civic, political, religious or educational leaders are often aware of aid sources in the immediate community. Some typical sources may include: P.T.A., Kiwanis, Lions, Elks, Knights of Columbus, Masons, Sons of Italy, Rotary, State Rehabilitation, American Legion, etc.

University Grants

Each year Northeastern University grants a substantial number of full and partial tuition grants to students who have demonstrated both above-average scholastic achievement and financial need. All applications for aid are automatically considered for all grants administered by the University. It is not necessary for an applicant to specify the grant in which he is interested.

Veterans' Benefits

Any veteran covered by the Veterans Readjustment Act of 1966, Public Law 89-358, should report to Room 245 Richards Hall to fill out the proper enrollment forms. These forms will be made available during registration periods for all students in the Law Enforcement Programs at special off-campus locations.

Students needing additional information as to eligibility, allowances, or other details are urged to contact their local office of the Veterans Administration as early as possible.

Guaranteed Student Loan Program

Under this program, students who are matriculated degree candidates, enrolled for at least one-half the normal academic work load, may borrow from a participating bank or other financial institution. Terms and conditions vary from state to state, but a student generally may borrow up to \$1,500 a year (the law allows a maximum of \$2,500 per year) depending on financial need. The federal government pays the interest while the student is in school if the student is eligible for interest subsidy.

The student must have submitted through the College Scholarship Service, a Parents' Confidential Statement or if he has been declared financially independent by the Financial Aid Office, a Students' Confidential Statement. These forms are available in the Financial Aid Office.

Applications for the loan itself are available from local banks or the Education Office of your State government. Additional information and necessary application forms for Massachusetts residents are available from the Financial Aid Office.

Martin Luther King, Jr. Scholarship Fund

Established in 1969 in memory of the late Rev. Martin Luther King Jr. Awards are made as openings occur, to adults from minority groups who would otherwise be unable to continue their education. Stipends will cover tuition expenses not to exceed six quarter hours in any academic quarter. (Excluding Summer Quarter).

The University does not award financial assistance in any form to non-citizens of the United States.

student activities and alumni information

Evening Student Council

The Evening Student Council was formed to provide a representative body to promote the welfare of the student body in non-academic areas and to foster extracurricular activities which will enrich University life. It affords participants opportunities to meet and develop close personal relationships with fellow students and administrative staff.

The Evening Student Council provides students with opportunities to develop leadership skills and gives them a chance to discuss matters of professional interest with experts in their chosen field.

The Council is made up of interested students in University and Lincoln College, representatives of part-time interest groups, and those specially certified by the Council because of their demonstrated interest in the overall adult programs of the University.

The E.S.C., a member of the International Association of Evening Student Councils, meets on the first Monday of each month at 8:30 p.m. Students are welcome to visit, observe, and express opinions concerning evening student life.

Social and Professional Clubs

Student activities for part-time students are planned, organized, and operated by the student body with the assistance of the Director of University-Lincoln College Student Activities. The programs are designed to keep pace with the changing needs of adult students and to provide maximum opportunity for student participation. All part-time students in University College and Lincoln College are welcome to participate.

The program is flexible in nature and pioneering in spirit to meet the needs of adult students. The Office of University-Lincoln College Student Activities is particularly interested in developing new clubs which will benefit students professionally and educationally. If students wish to

start clubs related to their professions, this office will help them plan and organize clubs on the local and national level. The program is dedicated to assisting the adult student in the development of his fullest potential. The University-Lincoln College Student Activities Office is located in 102 Churchill Hall.

Evening Ski Club

The Evening Ski Club was established as a special interest club by students in University and Lincoln College to give skiers an opportunity to meet other skiers for the purpose of promoting the sport and its related activities. Events sponsored by the Evening Ski Club include wine and cheese parties held locally and in the various ski areas of Maine, New Hampshire, and Vermont. A summer clambake is also arranged on a local beach, usually in July or August. Meetings are held from October through April on a bi-weekly basis on the main campus. Students interested should contact the Evening Student Activities Office in 102 Churchill Hall.

Use of Gymnasium Facilities

Specific schedules for use of the pool, weight training room, indoor athletic field and track, handball courts, gymnasium, and wrestling room are set up each quarter for use by all part-time students. In order to become eligible, students must obtain a temporary Gymnasium Pass each time they wish to use the Cabot Gymnasium Complex. Passes are available in the Cabot Complex, Monday through Friday from 4:30 p.m. to 9:00 p.m. and on Saturday and Sunday from 1:00 p.m. to 4:00 p.m. All students requesting a pass must present their Student Identification Card, and passes will be issued only on a first-come, first-served basis. Students using the Cabot Gymnasium Complex are required to abide by all the rules of the gym and may be asked to complete a Medical Release Form.

Society for the Advancement of Management

The Society for the Advancement of Management is the recognized national professional organization of managers in industry, commerce, government, and education. It has been dedicated to the advancement of management and managers since 1912, when the original Taylor Society was established. University chapters operate in 190 leading colleges and universities in the United States, Canada, Puerto Rico, and Hawaii.

The Northeastern University chapter is open to all adult students interested in furthering their growth and insight into the practice of the management professional. Meetings, conferences, and seminars are held.

Pi Tau Kappa Fraternity

Pi Tau Kappa is a social fraternity open to all evening students. It is organized to enhance their social welfare and promote closer affiliation with the University.

Kappa Tau Phi Sorority

Kappa Tau Phi Sorority is a social organization open to all evening women students. Its purpose is to promote fellowship among the women students and to form a closer tie with the University. Monthly dinner meetings are held. Two scholarships are awarded annually to scholastically superior women students.

Alpha Eta Rho

International Aviation Fraternity

The Nu Epsilon Chapter is a social organization open to all Aviation Technology Students. It is organized to actively associate the interested students of aviation with leaders and executives in the industry. This close association, strengthened through the bonds of an international aviation fraternity, establishes opportunities for every member in his relation to aviation and inspires interest and cooperation among those in the profession who are also members of Alpha Eta Rho.

Lamplighter Column

News articles written by interested students in University and Lincoln College may be submitted to the *Northeastern Today* newspaper to be printed under a Lamplighter heading. All news articles should be sent to the Evening Student Activities Office, 102 Churchill Hall at least two weeks prior to publication. Due to space considerations in the *Northeastern Today*, some articles may require editing by its professional staff.

Alumni Association

More than 52,000 alumni are members of the all-University Alumni Association, which has as its prime purposes the promotion of the welfare of Northeastern University, the establishment of a mutually beneficial relationship between the University and its alumni, and the perpetuation of fellowship among members of the Association.

The Association headquarters is located in Room 101 Ell. The official records and addresses of alumni are maintained in Room 260 of the United Realty Building.

Activities of the Association, including the Homecoming Day celebration and the annual presentation of Professional Promise Awards to outstanding seniors in each of the Colleges, are directed by the Vice President for Alumni Affairs. Alumni officers also attend meetings of undergraduate classes to form a closer relationship between the Association and its future members.

The Alumni Relations Office assists the various class officers in planning class reunions. Each class normally holds a reunion every five years during the month of June. The Vice President for the Alumni Class Council is responsible for coordinating class activities and organizing class functions.

The Vice President for Alumni Clubs works in close association with officers of the more than 50 Regional Alumni Clubs which have been established from coast to coast. All alumni are eligible to become members of these organizations. The alumni clubs meet periodically, often in conjunction with visits from members of the faculty or with athletic events.

For Boston area alumni, monthly luncheon meetings are held in both the downtown and uptown sections of the city.

The Association also sponsors and assists the alumnae organization and the Varsity Club, both of which have their own officers and conduct various programs throughout the year. Through the Varsity Club, the Association presents trophies to the outstanding athlete of the year in each of the six major sports.

The Northeastern University Alumni Association is a member of the American Alumni Council, a professional organization composed of representatives of all major colleges and universities in the United States and Canada.

Alumni Relations

The Alumni Association is providing a uniquely valuable service to both the University and the community by sponsoring admissions conferences for parents of high school students who are interested in attending college. These meetings, held in cooperation with the Northeastern Department of Admissions, have been extremely well attended. Local residents as well as alumni of the University have been invited to these conferences, which help to clarify many of the questions today's parents and young people have concerning application procedures of colleges and universities.

Placement Service

Many requests from employers are received by the College, for men and women of potential ability to fill important positions of responsibility. It is the policy of the College to serve the students whenever possible by placing them in those positions which promise attractive opportunities for development and advancement. The College, however, cannot guarantee to place its students, but it does endeavor to keep in close touch with those who desire placement service and to assist them in obtaining satisfactory advancements in positions and income. No charge is made for placement service. Those needing this assistance should arrange an appointment with the Director of Placement.

While the College cannot guarantee positions to its graduates, the number of requests usually exceeds the number available in the graduating class of any given year. The policy of the College is to find the best equipped and qualified men and women among its graduates for the positions which the College is called upon to fill.

The College, in recommending a graduate for a position, furnishes the prospective employer with the facts as to the graduate's ability, character, attitudes, habits, and other qualifications for the position as revealed by the College records. In the last analysis, however, placement in a position depends largely upon the graduate's ability to sell his services to the prospective employer. Most employers prefer to consider two or more candidates for a position and generally request the College to suggest more than one person. Many manufacturing and commercial firms throughout New England call upon the College to assist them in filling important executive and managerial positions.

academic programs of instruction

SCOPE OF PROGRAMMING

The Lincoln College and Lincoln College in collaboration with University College, the Wiggins Airways, Inc., and Hospitals in New England conducts educational programs at the undergraduate level in the following areas of technology:

- Pre-Technology Preparation
- Aviation Technology
- Science Technology
- Civil Engineering Technology
- Electrical Engineering Technology
- Mechanical Engineering Technology
- Computer Engineering Technology
- Environmental Control Technology
- Fire Technology

Program Selection

Students should determine that the program they desire is offered in a suitable time period. Most programs are offered in the evening on a part-time basis. However, Aviation Technology is offered on a full-time day basis.

In the fields of Electrical Engineering Technology and Mechanical Engineering Technology, full-time day cooperative programs were established in the fall of 1971. Students may enter as freshmen or transfer with advanced standing by applying to the Office of Admissions, Northeastern University, 150 Richards Hall.

Degrees and Certificates

Lincoln College conducts education programs on the undergraduate level in various technological areas leading to the following degrees and certificates:

1. Associate in Science degree (A.S.) requiring 96 to 99 quarter hours of credit.
2. Associate in Engineering degree (A.E.) requiring 96 quarter hours of credit.
3. Bachelor of Engineering Technology degree (B.E.T.) requiring 180 quarter hours of credit.

4. Certificates may be earned in specified programs with a minimum of 30 quarter hours of credit.
5. Most courses are available for special students.

Lincoln College collaborates with University College in programs leading to:

6. Bachelor of Science degree (B.S.) requiring 174 to 180 quarter hours of credit.

Opportunities for Associate Degree Graduates

Graduates of the Engineering or Science Technology Programs in Lincoln College, or other similar colleges and institutions, who have earned the Associate in Engineering or the Associate in Science degrees, may transfer applicable credits toward the degree requirements in the baccalaureate programs in Engineering Technology, Medical Technology, or Industrial Technology.

Those who have maintained a quality-point average of 2.500 or higher in the Associate degree programs may apply for transfer to either of the following College of Engineering curricula: (1) day-college Cooperative Education programs in Civil, Mechanical, Electrical, or Industrial Engineering with credit for up to two years of the five-year program, or (2) the part-time evening programs in Civil, Electrical, or Mechanical Engineering with credit for the first three years of the eight-year programs. Fractional credit may be awarded to students with a quality-point average slightly lower than 2.500.

PRE-TECHNOLOGY PREPARATION

(Non-Credit)

Beginning students who have been away from formal study for some time are frequently concerned about their study habits and their verbal, mathematical, and scientific backgrounds. Applicants who anticipate some problems should give serious consideration to enrolling in the non-credit introductory courses, the Reading Improvement Program, or doing review work through programmed instruction at the Learning Center.

Introductory Courses

These courses are designed to develop background for basic courses in the degree programs and thus increase the probability of successful achievement in advanced technology courses.

Introductory Mathematics I and II

A two-quarter review of high school algebra and some plane geometry designed to prepare students for the credit course in 10.307, College Algebra and Trigonometry I. These courses are required of students who do not demonstrate sufficient algebra proficiency on the Mathematics Placement Test. (See course description for 10.301 and 10.302 page 125.)

Introductory Physics I and II

A two-quarter relatively non-mathematical introduction to the concepts of physics designed to prepare students for the credit courses in 11.317, Physics I or 11.304, General Physics I. (See course description for 11.301 and 11.302, page 128.)

Basic Mathematics I and II

A two-quarter review of basic algebra designed to prepare students for the credit course in 10.327 Mathematics I. These courses are required of students who do not demonstrate sufficient proficiency in algebra on the Mathematics Placement Test. (See course descriptions for 10.330 and 10.331, page 126.)

English for International Students I, II, III

A three quarter, non-credit sequence for foreign speaking students covering introduction to English grammar with emphasis on listening, speaking, and writing; selected readings and exercises to strengthen vocabulary and pronunciation; preparation of written and oral reports, business and social correspondence; and advanced work in written and spoken English preparatory to entering 30.601, Composition and Rhetoric I.

General Interest Courses

The following courses of general interest are offered for students who desire to inquire into the technical fields but may not have the mathematical background to pursue the professional courses. In general, these courses may not be substituted for similar courses in the several technical curricula.

1. Technology of Modern Architecture I, II
2. Man and Materials
3. Electric Devices and Systems I
4. Electric Devices and Systems II
5. Interpretation of Industrial Drawings
6. Foundations of Mathematics I
7. Foundations of Mathematics II
8. Foundations of Mathematics III
9. Man's Physical Environment I
10. Man's Physical Environment II

Reading Improvement

The ability to read well is one of the most important basic tools for the successful completion of a college program. The University's Center for Reading Improvement gives the student an opportunity to develop good reading habits in preparation for the intensive reading assignments of college level courses. The following core skills are covered: previewing, locating main ideas and related details, using guide words and phrases,

identifying structural patterns, outlining and summarizing, note-taking, vocabulary building, skimming and scanning, speed-reading, and critical reading. Further information may be obtained at the Center for Reading Improvement.

Programmed Study

Students may enroll in non-credit, self-study courses to better prepare themselves for college academic work and strengthen their high school background at the University's Learning Center.

Courses which may be useful to students in the Lincoln College programs in technology are:

Slide Rule
Algebra

Trigonometry
Study Skills

Effective Listening
Calculus

Spelling
English

AVIATION TECHNOLOGY PROGRAM

The Aviation Technology program offered by Lincoln College in cooperation with Wiggins Airways is designed to provide the scientific, technological, and business backgrounds required by the modern commercial pilot or entrepreneur in today's aviation and aero space world as it operates within the framework of the total ship-rail-motor-aircraft transportation industry.

The tremendous expansion of aviation as an increasingly important sector of the nation's industrial economy has accelerated the demand for appropriately trained and educated personnel for careers related to the flight, instructional, regulatory, management, and technical aspects of the aviation industry.

Flight opportunities range from pilot or co-pilot in the single- or multi-engine air-taxi and cargo services of the local, fixed-base feeder airlines or private company, to flight engineer, first officer or captain in the high-speed, multi-jet-engined services of the national and international systems of the major airlines.

The education-training-regulation sector of the aviation industry provides additional career opportunities as flight, ground, or simulator instructors or as flight examiners, training or safety directors and supervisors in the licensing and regulatory agencies of local, state, or federal government.

Persons knowledgeable in the technology and regulation of aviation, who are also skillful in dealing with people, may pursue challenging and rewarding careers in aviation sales, airport operations, aviation business management, etc.

The Aviation Technology related program presently offered by Lincoln College is a two year full-time day program which leads to an Associate in Science degree.

Wiggins Airways

Wiggins Airways has been in operation since 1929. Their facilities are located at Norwood Airport, 15 miles from the main Northeastern University campus, provide the flight training courses for the Aviation Technology programs offered by Lincoln College. They offer air taxi, rental, maintenance, repair, aircraft service parts, electronics, and helicopter services. Wiggins is the New England distributor for Piper Aircraft.

The airport facilities comprise two 4,000' runways, one with high intensity lights; a Federal Aviation Administration control tower in operation from 8 a.m. to 8 p.m. every day of the year; "H" facility (navigational aid for radio location); two Unicom frequencies for radio communication; and weather teletype service. Modern, air-conditioned classroom facilities,

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with visual aids, library, and other study aids are available for academic and ground related courses.

The aircraft fleet consists of eighteen Piper Cherokee 140's; two Piper Cherokee 180's; one Piper Cherokee 6; plus the following: Piper Twin Engine Aircraft — Comanche, Aztec and Navajos, two Flightmatic Simulators and a General Aviation Training Simulator. All aircraft are maintained on the premises in a federally certified aircraft repair station which is also Piper factory certified.

Aviation Technology*Leading to the Degree of Associate in Science*

(Day Program — 2 Years)

The Curriculum of the Aviation Technology program is designed to provide, in the shortest reasonable time, the required amount of related academic instruction and accumulated flight time to thoroughly prepare the student for certification with the Private and Commercial Ratings by the Federal Aviation Administration. In the two year program, the student will acquire the scientific, technological, and business background for employment in a variety of positions including: Flight Crew Officers, Airport Management, Fixed Base Operations, Air Transportation, Aviation Sales, F.A.A. positions, etc.

Prerequisites: Satisfactory completion of the Mathematics Placement Test or Introductory Mathematics I and II (10.301 and 10.302). Medical Certificate — F.A.A. Class I or II. Interview with Director of Flight instruction and Aviation Program Counselor.

First Year		Total Yearly Q.H.
10.307, 10.308	Algebra & Trigonometry, I, II	8
96.391, 96.392	Air Science A & B	6
30.603	Comp. & Rhet. (Int.)	4
30.606	Intro. to Literary Forms Int.	4
11.317, 11.318, 11.319	Physics I, II, III	12
48.514	Elements of Transportation & Distribution	2
96.399	Flight Physiology	2
96.395	Meteorology & Climatology A	3
48.593	Air Transportation A	3
96.331, 96.332, 96.333	Primary Flight I, II, III	4½
Summer Term (Flight Option)		
96.341, 96.342	Commercial Flight I, II	3
Second Year (Flight Option)		
96.324, 96.325	Introductory Avionics; Avionics	8
96.393, 96.394	Advanced Air Science A, B	6
96.308	Aircraft Power & Systems	4
96.425	Chronology of Aviation	2
96.396	Meteorology & Climatology B	3
48.594	Air Transportation B	3
96.343, 96.344, 96.345	Commercial Flight III, IV, V	4½
96.376, 96.377	General Aviation Operations A, B	6
41.551, 41.552	Accounting A, B	6
96.360	Aircraft Analysis	2
		<hr/> Total 96

Second Year (Non-Flight Options)

Students electing the Non-flight Option will replace the commercial flight courses with a sequence of air transportation, law enforcement, engineering, or airport management courses. These courses are listed under the description of courses at the end of the catalogue.

Students having definite plans to enter other upper class programs following the completion of the Associate degree should consult their adviser regarding entrance requirements prior to registering for second year courses.

Avionics Technology (Second year option)

The electronics equipment used in today's aircraft is becoming increasingly sophisticated and complex. This increases the need for highly trained Avionics Technicians to maintain this equipment. The Avionics curriculum provides the special knowledge and skills demanded in this special area. Graduates from this program are eligible to write the Federal Communications Commission examination for the 2nd Class Radio License.

69.324, 96.325	Introductory Avionics; Avionics	8
96.393, 96.394	Advanced Air Science A, B	6
96.308	Aircraft Power & Systems	4
96.425	Chronology of Aviation	2
96.396	Meteorology & Climatology B	3
48.594*	Air Trans B	2
96.360	Aircraft Analysis	2
96.376*	General Aviation Operation A	3
09.307, 09.308, 09.309	Electrical & Electronic Graphics I, II, III	6
96.326, 96.327, 96.328	Avionics Laboratory I, II, III	6
03.387, 03.388	Integrated Circuits I, II	4
09.351, 09.352	Principles of Computer Programming I, II	4

 Total 50

*Optional

CIVIL ENGINEERING TECHNOLOGY PROGRAMS

Civil Engineering deals with the planning and construction of all kinds of relatively permanent structures and public works. Its major functions are: the preparation of surveys (topographical, geological, traffic, utility, etc.); the design of structures (buildings, bridges, dams, harbor facilities, etc.); the planning of municipal systems (water, sanitary, gas, flood control, air pollution control, etc.); and the development of transportation facilities (highway, railway, waterway, airway, etc.).

In performing these functions, the civil engineer will work in close association with professionals in the field, and he may develop technologically to function independently and in positions of managerial responsibility.

Employment opportunities for Civil Engineering Technology Program graduates are with town, city, state, or federal public works departments and agencies; private consulting, engineering, architectural, and construction organizations; and with railroads and the military.

The Civil Engineering Technology program and related programs offered by Lincoln College are:

Associate in Engineering Degree

Architectural Engineering Technology	page 66
Environmental Engineering Technology	page 67
Structural Engineering Technology	page 69
Surveying and Highway Engineering Technology	page 70

Bachelor of Engineering Technology Degree

Civil Engineering Technology	pages 71-72
Mechanical-Structural Engineering Technology	pages 97-98
Environmental Control Technology	pages 95-96

Architectural Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Architectural Engineering Technology prepares the graduate to assume responsibilities in the planning, design, and construction of buildings. Employment opportunities are with architectural groups, consulting engineering firms, and government agencies.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Numbers	Course	Q.H.
10.307, 10.308	College Algebra & Trig. I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

01.301, 01.302, 01.303	Surveying I, II, III	6
02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
*09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6

Third Year

01.321, 01.322, 01.323	Introduction to Structures I, II, III	6
01.401, 01.402	Tech. of Modern Architecture I, II	4
01.390	Construction Administration	2
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Prog. I, II, III	6

Fourth Year

01.324, 01.325, 01.326	Structural Analysis I, II, III	6
01.331, 01.332, 01.333	Design of Structures I, II, III	6
01.393, 01.394, 01.395	Architectural Design I, II, III	6
01.371, 01.372, 01.373	Reinforced Concrete Design I, II, III	6

Total A.E. degree 96

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

* Course Nos. 27-541, 542, 543, Drawing I, II, III — a basic course in developing pencil, pen, and wash techniques; and the study of basic drawing problems using a variety of media — may be used to supplement this program.

Environmental Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Environmental Engineering Technology prepares the graduate to assume responsibilities related to the design, construction, operation, and supervision of municipal plants and systems concerned with the storage and distribution of water and also the disposal of sewage and waste in urban areas with due consideration for contamination and pollution. Employment opportunities are with town, city, and state public works departments, private engineering consultants, architects, contractors, and many other engineering organizations.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

01.301, 01.302, 01.303	Surveying I, II, III	6
02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6

Third Year

01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
12.544, 12.545, 12.546	†General Chemistry I, II, III	6

Fourth Year

01.324, 01.325, 01.326	Structural Analysis I, II, III	6
01.351, 01.352, 01.353	Environmental Engineering I, II, III	6
01.361, 01.362, 01.363	Materials and Soil Mechanics I, II, III	6
01.371, 01.372, 01.373	Reinforced Concrete Design I, II, III	6

Total A.E. degree 96

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

†Students may elect to add 12.547, 12.548, 12.549 Gen. Chem. Laboratory I, II, III (3 q.h.)



GODFREY

LOWELL C.

EDUCATION

Structural Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Structural Engineering Technology prepares the graduate to assume responsibilities related to the planning, design, and supervision of the construction of buildings, bridges, foundations; flood-control projects and all fixed structures. Employment opportunities are with consulting engineering firms, architectural groups, contractors, railroads, government agencies, the military, and other design-related companies.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

01.301, 01.302, 01.303	Surveying I, II, III	6
02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6

Third Year

01.321, 01.322, 01.323	Introduction to Structures I, II, III	6
01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6

Fourth Year

01.324, 01.325, 01.326	Structural Analysis I, II, III	6
01.331, 01.332, 01.333	Design of Structures I, II, III	6
01.361, 01.362, 01.363	Materials and Soil Mechanics I, II, III	6
01.371, 01.372, 01.373	Reinforced Concrete Design I, II, III	6

Total A.E. degree	96
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Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

Surveying and Highway Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Surveying and Highway Engineering Technology prepares the graduate to assume responsibilities related to the preparation and calculation of preliminary and legal surveys required for both small projects such as subdivision work, individual lot layouts, and highway layouts as well as more complex projects relating to sewer systems, pipelines, power transmission lines, dams, reservoirs, and aqueducts. Employment opportunities are with independent surveying companies; civil engineering companies; highway, transit, and railroad planning groups, as well as cartographers, construction companies, and contractors.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year		
Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12
Second Year		
01.301, 01.302, 01.303	Surveying I, II, III	6
02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6
Third Year		
01.304, 01.305, 01.306	Advanced Surveying I, II, III	6
01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
Fourth Year		
01.307, 01.308, 01.309	Legal Aspects of Surveying I, II, III	6
01.311, 01.312, 01.313	Highway Engineering I, II, III	6
01.361, 01.362, 01.363	Materials and Soil Mechanics I, II, III	6
01.371, 01.372, 01.373	Reinforced Concrete Design I, II, III	6
Total A.E. degree		96

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

Civil Engineering Technology

(Candidate for Accreditation by Engineers' Council for Professional Development subject to annual review)

Leading to the Degree of Bachelor of Engineering Technology

The program in Civil Engineering Technology prepares the graduate to assume broad responsibilities related to surveys required to develop initial design criteria and specifications, and to become involved in the planning, design, and construction of all kinds of relatively permanent structures, municipal plants and systems, or transportation systems and facilities. Employment opportunities are in private consulting firms, construction companies, and public works agencies. Work involving surveying, design, and supervision is open to graduates.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

01.301, 01.302, 01.303	Surveying I, II, III	6
09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6
30.601, 30.602	*Composition and Rhetoric I, II	4
	English Elective	2

Third Year

01.304, 01.305, 01.306	Advanced Surveying I, II, III	6
02.301, 02.302, 02.303	Mechanics (Statics), I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
	**Laboratory	6

Fourth Year

01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
01.321, 01.322, 01.323	Introduction to Structures I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
23.501, 23.502, 23.503	†Western Civilization I, II, III	6

Fifth Year

01.324, 01.325, 01.326	Structural Analysis I, II, III	6
12.544, 12.545, 12.546	††General Chemistry I, II, III	6
39.501, 39.502, 39.503	Economic Principles and Problems I, II, III	6
01.331, 01.332, 01.333	Design of Structures I, II, III	6

*30.603 Composition and Rhetoric (Intensive) may be substituted for 30.601, 30.602 Composition and Rhetoric I, II.

** Six quarter hours of laboratory work is required, see selection titled "Civil Engineering Laboratories."

10.324, 10.325, 10.326 Differential Equations I, II, III is recommended for all students planning advanced engineering technology subjects.

†23.509, 23.510 Western Civilization A, B (6 q.h.) may be substituted for 23.501, 23.502, 23.503 Western Civilization I, II, III.

††Students may elect to add 12.547, 12.548, 12.549 Gen. Chem. Laboratory I, II, III (3 q.h.)

Sixth Year

01.371, 01.372, 01.373	Reinforced Concrete Design I, II, III	6
01.361, 01.362, 01.363	Materials and Soil Mechanics I, II, III	6
19.501, 19.502, 19.503	‡Psychology I, II, III	6
	*Elective I, II, III	6

Seventh Year

01.311, 01.312, 01.313	Highway Engineering I, II, III	6
	Elective I, II, III (Technical)	6
	*Elective I, II, III	6

Eighth Year

01.351, 01.352, 01.353	Environmental Engineering I, II, III	6
30.604, 30.605	†Introduction to Literary Forms I, II	4
	English Elective	2
	*Elective I, II, III	6

 Total B.E.T. degree 180
Suggested Electives

		Q.H.
01.307, 01.308, 01.309	Legal Aspects of Surveying I, II, III	6
01.327, 01.328, 01.329	Advanced Structural Analysis I, II, III	6
01.334, 01.335, 01.336	Advanced Structural Design I, II, III	6
01.401, 01.402	Technology of Modern Architecture I, II	4
01.390	Construction Administration	2
18.511, 18.512, 18.513	Biology	12
18.521, 18.522, 18.523	Microbiology	12

Civil Engineering Laboratories

01.310	Surveying Laboratory	2
01.364	Materials & Soil Mechanics Laboratory	2
01.380, 01.381, 01.382	Environmental Laboratory I, II, III	6

Elective courses for which proper preparation exists may be chosen from within or outside of the Civil Engineering discipline.

Transfer students may petition for elective credits for courses that are suitable to the curriculum.

Graduates of the Bachelor of Engineering Technology programs desiring to pursue programs leading to the Bachelor of Science in Engineering degree at Northeastern University may apply through the Admissions Department (153 RI). Programs in Electrical, Civil, and Mechanical Engineering are available on a part-time as well as a regular cooperative program. Industrial and Chemical Engineering programs are available only during the regular day programs.

Candidates must have at least 2.75 cumulative average and complete a course program prescribed by the major department and the Dean's office.

*Before registering for any electives, the student should submit a proposed program of elective courses — preferably representing a minor field of concentration consistent with his personal career objectives — for approval by the Academic Standing Committee. 10.324, 10.325, 10.326 Differential Equations I, II, III is recommended for all students planning advanced engineering technology subjects.

†30.606 Introduction to Literary Forms (Intensive) may be substituted for 30.604, 30.605 Introduction to Literary Forms.

‡19.508, 19.509 Fundamentals of Psychology (8 q.h.) may be substituted for 19.501, 19.502, 19.503 Psychology I, II, III.

ELECTRICAL ENGINEERING TECHNOLOGY PROGRAMS

Electrical Engineering deals with the design and operation of equipment and systems related to power, communications, data-processing, and electrical control. Its major functions are: 1) the generation, transmission and distribution of electrical energy for light and power purposes; 2) the development and production of equipment for telephone, radio, television, radar, and communication; 3) the design and construction of data-processing systems and analog or digital computers; and 4) the application of electrical and electronic devices in the control of processes and manufacture.

Employment opportunities for the Electrical Engineering Technology graduate are in public and private research laboratories, in engineering consulting groups dealing with industrial and plant applications, design organizations dealing with operation and manufacture, in sales engineering, and in the electric utility industry.

The Electrical Engineering Technology program and related programs offered by Lincoln College are:

Associate in Engineering Degree

Bioelectric Engineering Technology	page 92
Electrical Power Engineering Technology	page 74
Computer Engineering Technology	page 93
Electronics Engineering Technology	page 75

Post-Associate Degree Certificate

Control Systems Engineering Technology	page 94
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Bachelor of Engineering Technology Degree

Electrical Engineering Technology	pages 76-78
(Accredited by Engineer's Council for Professional Development)	

The program in Electrical Engineering Technology leading to the Bachelor of Engineering Technology is also offered as a day cooperative program. A specimen curriculum is shown on pages 79-80. For further information please call (617) 437-2200, or write.

The Dean of Admissions
Northeastern University
360 Huntington Avenue
Boston, Massachusetts 02115

Electrical Power Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Electric Power Engineering Technology prepares the graduate to assume responsibilities related to the design, installation, operation, and maintenance of electrical machinery, power and control apparatus, and larger equipment employing heavy currents. The curriculum includes the study of the generation, transmission, and distribution of electrical energy for light and power, and the application and operation of electrical machinery in industry.

Employment opportunities are in public and investor-owned electrical utilities, electrical manufacturing companies, consulting engineering firms, control equipment design organizations, and communications companies.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year		
Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12
Second Year		
03.301, 03.302, 03.303	Circuit Theory I, II, III	6
09.307, 09.308, 09.309	Electrical and Electronic Graphics I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6
Third Year		
03.304, 03.305, 03.306	Circuit Theory IV, V, Electrical Measurements	6
03.346, 03.347, 03.348	Electronics for Industry I, II, III	6
03.331, 03.332, 03.333	Energy Conversion I, II, III	6
	Technical Elective I, II, III	6
Fourth Year		
03.334, 03.335, 03.336	Control Circuits I, II, III	6
03.337, 03.338, 03.339	Basic Power Systems I, II, III	12
03.341, 03.342, 03.343	Power and Control Labs. I, II, III	6
Total A.E. degree		96

Suggested Technical Electives

04.381, 04.382, 04.383	Nuclear Technology I, II, III	6
02.351, 02.352, 02.353	Thermodynamics I, II, III	6

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

Electronics Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Electronic Engineering Technology prepares the graduate to assume responsibilities related to the design, development, and operation of communications, data-processing, and electronic control equipment for applications in computers, military and space explorations, and in automated industrial production equipment. Employment opportunities are in communications equipment, electrical manufacturing, data-processing and control, equipment organizations, as well as other engineering oriented companies.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year		
Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12
Second Year		
03.301, 03.302, 03.303	Circuit Theory I, II, III	6
09.307, 09.308, 09.309	Electrical and Electronic Graphics I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6
11.321, 11.322, 11.323	Wave Phenomena, Semiconductor Physics, Semiconductor Devices	6
Third Year		
03.304, 03.306, 03.323	Circuit Theory IV, Electrical Measurements, Electronic Lab.	6
03.311, 03.312, 03.313	Electronics I, II, III	12
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
Fourth Year		
03.314, 03.315, 03.316	Pulse and Digital Circuits I, II, III	6
*03.317, 03.318, 03.319	Principles of Communication Systems I, II, III	12
03.327, 03.328, 03.329	Advanced Electronic Lab. I, II, III	6
Total A. E. degree		96

NOTE: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

*03.387, 03.388, 03.389 Active Integrated Circuits I, II, III
plus

03.381, 03.382, 03.383 Transistor-Circuit Engineering I, II, III

may be substituted for 03.317, 03.318, 03.319 Principles of Communication Systems I, II, III.

Electrical Engineering Technology

(Accredited by — Engineers' Council for Professional Development)

Leading to the Degree of Bachelor of Engineering Technology

The program in Electrical Engineering Technology prepares the graduate to assume broad responsibilities related to the design, development, operation, installation, and production of a wide variety of electrical and electronic equipment concerned with the generation and utilization of electric energy, communications, data-processing, and industrial control. Employment opportunities are in public and private research laboratories, engineering consulting firms dealing with industrial and plant applications, electric utilities, electrical and electronic organizations concerned with operation and manufacture as well as installation and sales.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

03.301, 03.302, 03.303	Circuit Theory I, II, III	6
09.307, 09.308, 09.309	Electrical and Electronic Graphics I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6
30.601, 30.602	*Composition and Rhetoric I, II	4
	English Elective	2

Third Year

03.304, 03.305, **03.306	Circuit Theory IV, V, and Electrical Measurements	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
10.324, 10.325, 10.326	Differential Equations, I, II, III	6
11.321, 11.322, 11.323	Wave Phenomena, Semiconductor Physics, Semiconductor Devices	6

Fourth Year

03.311, 03.312, 03.313	Electronics I, II, III	12
†03.324, 03.325, 03.323	Circuits Laboratory I, II and Electronic Lab.	6
03.331, 03.332, 03.333	Energy Conversion I, II, III	6

*30.603 Composition and Rhetoric (Intensive) may be substituted for 30.601, 30.602 Composition and Rhetoric I, II.

**Electronically oriented students may replace 03.305 Circuit Theory V, with the technical course provided (see current schedule).

†03.324, 03.325 Circuits Laboratory is required for students having no previous degrees. Transfer students with an Associates degree will be assigned to a projects laboratory.

Fifth Year

03.317, 03.318, 03.319	Principles of Communication Systems	12
03.361, 03.362, 03.363	Transients in Linear Systems I, II, III	6
23.501, 23.502, 23.503	*Western Civilization I, II, III	6

Sixth Year

03.327, 03.328, 03.329	Advanced Electronic Lab. I, II, III	6
03.371, 03.372, 03.373	Analog, Digital and Hybrid Computers I, II, III	6
39.501, 39.502, 39.503	Economic Principles and Problems I, II, III	6
	* Elective I, II, III	6

Seventh Year

03.377, 03.378, 03.379	Control Systems I, II, III	6
19.501, 19.502, 19.503	†Psychology I, II, III	6
	* Elective I, II, III	6

Eighth Year

30.604, 30.605	‡Introduction to Literary Forms I, II	4
	English Elective	2
	* Elective I, II, III	6
	* Elective I, II, III	6

Total B.E.T. degree 180
Suggested Technical Electives

Q.H.

03.314, 03.315, 03.316	Pulse and Digital Circuits I, II, III	6
03.337, 03.338, 03.339	Basic Power Systems I, II, III	12
03.341, 03.342, 03.343	Power & Control Labs I, II, III	6
03.364, 03.365, 03.366	Advanced Circuit Theory I, II, III	6
03.367, 03.368, 03.369	Advanced Pulse & Digital Circuits, I, II, III	6
03.374, 03.375, 03.376	Digital Systems I, II, III	6
*03.381, 03.382, 03.383	Linear Active Circuit Design I, II, III	6
03.384, 03.385, 03.386	Microwave Semiconductor Devices and Circuits I, II, III	6
*03.387, 03.388, 03.389	Integrated Circuits I, II, III	6
09.354, 09.355, 09.356	Computer Systems I, II, III	6
09.357, 09.358, 09.359	Computer Aided Design I, II, III	6
09.361, 09.362, 09.363	Computer Controlled Systems I, II, III	6
03.360	Introduction to Radar Systems	4
11.324	Introductory Survey of Lasers	2

*23.509, 23.510 Western Civilization A, B may be substituted for 23.501, 23.502, 23.503 Western Civilization I, II, III.

*Before registering for any electives, the student should submit a proposed program of elective courses — preferably representing a minor field of concentration consistent with his personal career objectives — for approval by the Committee on Education.

10.351, 10.352, 10.353 Advanced Mathematics I, II, III is recommended for all students planning advanced engineering technology subjects.

**03.387, 03.388, 03.389 Integrated Circuits I, II, III

plus

03.381, 03.382, 03.383 Linear Active Circuit Design I, II, III.

may be substituted for 03.317, 03.318, 03.319 Principles of Communication Systems I, II, III.

†19.508, 19.509 Fundamentals of Psychology I, II (8 q.h.) may be substituted for 19.501, 19.502, 19.503 Psychology I, II, III (6 q.h.)

‡30.606 Introduction to Literary Forms (Intensive) may be substituted for 30.604, 30.605 Introduction to Literary Forms I, II.

78 / ACADEMIC PROGRAMS OF INSTRUCTION

Electrical Engineering Technology courses of elective nature may be chosen from the above list of courses.

Elective courses for which proper preparation exists may be chosen from within or outside of the electrical engineering discipline.

Graduates of the Bachelor of Engineering Technology program desiring to pursue programs leading to the Bachelor of Science in Engineering degree at Northeastern University may apply through the Admissions Department (150RI). Programs in Electrical, Civil, and Mechanical Engineering are available on a part-time as well as a regular cooperative program. Industrial, and Chemical Engineering programs are available only during the regular day programs.

Candidates must have at least a 2.75 cumulative average and complete a course program prescribed by the major department and the Dean's office.

Electrical Engineering Technology

(Day Cooperative Curriculum)

Leading to the Degree of Bachelor of Engineering Technology

(The first four years of this program are being offered during 1974-75, quarters 1 through 9.)

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12
30.113	Freshman Writing	4
30.114, 30.115	Introduction to Lit., Great Themes in Lit.	8
09.421, 09.422, 09.423	Principles of Computer Programming I, II, III	6
09.461, 09.462, 09.463	Engineering Design Graphics I, II, III	6
11.373, 11.374	Physics Lab. I, II	2

Second Year

10.421, 10.422	Calculus A, B	8
03.451, 03.452	Circuit Analysis I, II	8
11.420	Physics IV	4
03.440	Physical Electronics	4
03.324	Circuits Laboratory I	2
	Liberal Arts Elective I, II	8

***Third Year**

03.460	Engineering Analysis I	4
03.430	Energy Conversion	4
03.453, 03.454	Circuit Analysis III, IV	8
03.311, 03.312	Electronics I, II	8
39.115	Principles of Economics	4
03.410	Electrical Measurements	4
03.325, 03.323	Circuits Lab. II, Electronic Lab.	4

Fourth Year

03.470	Digital Computers	4
03.477	Control Engineering	4
03.313	Electronics III	4
03.327, 03.328	Advanced Electronic Lab, I, II	4
	**Technical Elective (A or B) I, II	8
	Liberal Art Electvie II	4

*Note: Students desiring to terminate their program at the end of quarter 7 may petition to be awarded the Associate in Engineering degree.

**Technical Elective A: Power Systems Sequence

Technical Elective B: Communication Engineering Sequence (See next page).

		Fifth Year	
Course Number	Course		Q.H.
03.478	Control Engineering II		4
03.437	Distrb. Systems		4
03.329	Advanced Electronic Lab. III		2
03.461	Engineering Analysis II		
	or		4
02.411	Mechanics A		
	Liberal Art Elective		8
	*Technical Elective (A or B) III		4
	Technical Elective		4
Total B.E.T. degree			178 Q.H.

TECHNICAL ELECTIVE SEQUENCES

Power Systems Sequence			
03.337	Basic Power Systems I		4
03.338	Basic Power Systems II		4
03.339	Basic Power Systems III		4
	Technical Elective (Selected from below)		4
Communication Engineering Sequence			
03.317	Principles of Communication Systems I		4
03.318	Principles of Communication Systems II		4
03.319	Principles of Communication Systems III		4
	Technical Elective (selected from below)		4
<i>Suggested Technical Electives</i>			
03.317	Principles of Communication Systems I		4
03.337	Basic Power Systems I		4
03.490	Optical Instrumentation		4
04.481	Nuclear Technology		4

Graduates of the Day Bachelor of Engineering Technology program who have maintained a superior level of achievement and who wish to continue their academic studies may be qualified to enter the part time or full time program leading to the Bachelor of Science in Engineering. For further information contact the Lincoln College office at 219 Hayden Hall, telephone 437-2500.

MECHANICAL ENGINEERING TECHNOLOGY PROGRAMS

Mechanical Engineering deals with the harnessing of power resources by means of machinery to perform useful work. In contrast to civil engineering which deals primarily with static forces and structures, mechanical engineering is more concerned with the motion and kinetics of devices which are activated by hydraulic, electrical, mechanical, or thermodynamic forces. Major functions of the mechanical engineer are: 1) design and installation of all kinds of machinery from pocket watches to the largest of steel boring mills; 2) development and production of engines and transportation equipment (automobile, aircraft, ship, railway, etc.); 3) construction and operation of furnaces and boilers as well as heating and air-conditioning equipment for the control of atmospheric and environmental conditions.

Employment opportunities for Mechanical Engineering Technology graduates are in the areas of 1) research, design, or development; 2) production, operation, testing, or control and 3) installation, maintenance, and sales. In performing these functions, graduates will work in close association with professionals in the field and may develop technologically to function independently and in positions of managerial responsibility.

The Mechanical Engineering Technology program and related programs offered by Lincoln College are:

Associate in Engineering Degree

Mechanical Engineering Technology	page 82
Heat Engineering Technology	page 83

Bachelor of Engineering Technology Degree

Mechanical Engineering Technology (Accredited by Engineers' Council for Professional Development)	pages 84-85
Mechanical-Structural Engineering Technology	pages 97-98

The program in Mechanical Engineering Technology leading to the Bachelor of Engineering Technology is also offered as a day cooperative program. A specimen curriculum is shown on pages 86 and 87. For further information please call (617) 437-2200, or write.

The Dean of Admissions
Northeastern University
360 Huntington Avenue
Boston, Massachusetts 02115

Mechanical Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Mechanical Engineering Technology prepares the graduate to assume responsibilities related to the design, production, and installation of mechanical tools, machinery, engines, and transportation equipment in which there is an intermingling of mechanical and hydraulic forces. Because of the increased mechanization of all industry, varied employment opportunities are available in private engineering consultant groups, and in light and heavy industries, as well as almost all engineering design organizations.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6

Third Year

02.304, 02.305, 02.306	Mechanics (Dynamics) I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
*02.341, 02.342, 02.343	Materials I, II, III	6
09.314, 09.315, 09.316	Engineering Design I, II, III	6

Fourth Year

01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
02.324, 02.325, 02.326	Advanced Stress Analysis I, II, III	6
02.327, 02.328, 02.329	Mechanical Design I, II, III	6
02.331, 02.332, 02.333	Mechanical Technology Lab. I, II, III	6

Total A.E. degree 96

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

*03.320, 03.321, Electricity and Electronics I, II, III, may be substituted for 02.341, 02.342, 02.343 Materials I, II, III.

Heat Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Heat Engineering Technology prepares the graduate to assume responsibilities related to the design, operation, and construction of engines and equipment in which there are thermodynamic, hydraulic, and mechanical forces. Typical examples are automobile, aircraft, and ship engines; boilers and furnaces; as well as heating, air conditioning, and ventilating devices. Employment opportunities are with architectural firms, engineering consultants, light and heavy mechanical industries, as well as other engineering oriented organizations.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
09.311, 09.312, 09.313	Engineering Graphics I, II, II	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6

Third Year

02.304, 02.305, 02.306	Mechanics (Dynamics) I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
02.351, 02.352, 02.353	Thermodynamics I, II, III	6
09.314, 09.315, 09.316	Engineering Design I, II, III	6

Fourth Year

01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
02.354, 02.355, 02.356	Heat Transfer I, II, III	6
02.357, 02.358, 02.359	Heat Engineering I, II, III	6
02.361, 02.362, 02.363	Heat Technology Lab. I, II, III	6

Total A.E. Degree 96

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

Mechanical Engineering Technology

(Accredited by Engineers' Council for Professional Development)

Leading to the Degree of Bachelor of Engineering Technology

The program in Mechanical Engineering Technology prepares the graduate to assume broad responsibilities related to the design, development, production, operation, and installation of all kinds of machinery, engines, and transportation equipment as well as boilers, furnaces, and heating or air conditioning equipment, which involve interactions of mechanical, hydraulic, and thermodynamic forces. Employment opportunities are in industry producing mechanized and automated equipment, design and engineering organizations, and in companies, dealing primarily with manufacture and production.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6
30.601, 30.602	*Composition and Rhetoric I, II	4
	English Elective	2

Third Year

02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
02.341, 02.342, 02.343	Materials I, II, III	6
09.314, 09.315, 09.316	Engineering Design I, II, III	6
	**Elective I, II, III	6

Fourth Year

01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
02.304, 02.305, 02.306	Mechanics (Dynamics) I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
23.501, 23.502, 23.503	†Western Civilization I, II, III	6

*30.603 Composition and Rhetoric (Intensive) may be substituted for 30.601, 30.602 Composition and Rhetoric I, II.

**Before registering for any electives, the student should submit a proposed program of elective courses — preferably representing a minor field of concentration consistent with his personal career objectives — for approval by the Academic Standing Committee.

10.324, 10.325, 10.326 Differential Equations I, II, III is recommended for all students planning advanced engineering technology subjects.

†23.509, 23.510 Western Civilization A, B (6 q.h.) may be substituted for 23.501, 23.502, 23.503 Western Civilization I, II, III.

Fifth Year

02.324, 02.325, 02.326	Advanced Stress Analysis I, II, III	6
02.351, 02.352, 02.353	Thermodynamics I, II, III	6
04.381, 04.382, 04.383	Nuclear Technology I, II, III	6
39.501, 39.502, 39.503	Economic Principles and Problems I, II, III	6

Sixth Year

02.327, 02.328, 02.329	Mechanical Design I, II, III	6
02.354, 02.355, 02.356	Heat Transfer I, II, III	6
19.501, 19.502, 19.503	*Psychology I, II, III	6
	**Elective I, II, III	6

Seventh Year

02.331, 02.332, 02.333	Mechanical Technology Lab. I, II, III	6
02.357, 02.358, 02.359	Heat Engineering I, II, III	6
	**Elective I, II, III	6

Eighth Year

02.361, 02.362, 02.363	Heat Technology Lab. I, II, III	6
30.604, 30.605	†Introduction to Literary Forms I, II	4
	English Elective	2
	**Elective I, II, III	6

Total B.E.T. degree 180

Suggested Technical Electives

	Q.H.	
02.337, 02.338, 02.339	Mechanical Vibrations I, II, III	6
03.320, 03.321, 03.322	Electricity and Electronics I, II, III	6
02.334, 02.335, 02.336	Experimental Stress Analysis I, II, III	6
02.344, 02.345, 02.346	Applied Metallurgy I, II, III	6
02.347	Principles of Aerodynamics	4

Transfer students may petition for elective credits for courses that are suitable to the curriculum.

Graduates of the Bachelor of Engineering Technology program desiring to pursue programs leading to the Bachelor of Science in Engineering degree at Northeastern University may apply through the Admissions Department (150 RI). Programs in Electrical and Civil Engineering are available on a part-time as well as a regular cooperative program. Industrial, Chemical and Chemical Engineering programs are available only during the regular day programs.

Candidates must have at least a 2.75 cumulative average and complete a course program prescribed by the major department and the Dean's office.

*19.508, 19.509 Fundamentals of Psychology I, II (8 q.h.) may be substituted for 19.501, 19.502, 19.503 Psychology I, II, III.

**Elective courses for which proper preparation exists may be chosen from within or outside of the Mechanical Engineering discipline.

†30.606 Introduction to Literary Forms (Intensive) may be substituted for 30.604, 30.605 Introduction to Literary Forms I, II.

Mechanical Engineering Technology

(Day Cooperative Curriculum)

Leading to the Degree of Bachelor of Engineering Technology

(The first four years of this program are being offered during 1974-75, quarters 1 through 9.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12
30.113	Freshman Writing	4
30.114, 30.115	Introduction to Lit., Great Themes in Lit.	8
09.421, 09.422, 09.423	Principles of Computer Programming I, II, III	6
09.461, 09.462, 09.463	Engineering Design Graphics I, II, III	6
11.373, 11.374	Physics Lab. I, II	2

Second Year

10.421, 10.422	Calculus A, B	8
02.411, 02.412	Mechanics A, B	8
09.464	Engineering Design Graphics IV	4
02.414	Stress Analysis A	4
02.461	Machine Shop (or Liberal Art elective on petition with experience)	4
02.431	Materials A	4

***Third Year**

02.413	Mechanics C	4
03.420	Electricity & Electronics I	4
02.415	Stress Analysis B	4
02.465	Heat Lab. I	2
02.462	Mechanical Lab. I	2
02.421, 02.422	Thermodynamics A, B	8
93.115	Principles of Economics	4
02.441	Fluid Mechanics A	4

Fourth Year

02.417, 02.418	Mechanical Design A, B	4&2
02.463, 02.464	Mechanical Lab. II, III	4
02.442	Fluid Mechanics B	2
02.423	Thermodynamics C	4
	Technical Elective I, II	8
	BA Elective or Industrial Engineering Elect. I	4
	Liberal Art Elective II	4

*NOTE: Students desiring to terminate their program at the end of quarter 7 may petition to be awarded the Associate in Engineering degree.

Fifth Year

Course Number	Course	Q.H.
04.481	Nuclear Technology	4
02.467	Project Lab.	4
02.466	Heat Lab. II	2
	Technical Elective II	4
02.424	Thermodynamics D	2
	Technical Elective I, II	8
	Liberal Art Elective I, II	8
Total B.E.T. degree		<hr/> 178

Technical Electives Must Be Chosen From the Following List

02.416	Stress Analysis C	4
02.452	Exp. Stress Analysis	4
02.451	Mech. Vibrations	4
02.432	Materials B	4
02.433	Applied Metallurgy	4
02.425	Thermodynamics E	4
10.423	Differential Equations	4
03.421	Elect. & Electronics 2	4
03.490	Optical Instrumentation	4

Graduates of the Day Bachelor of Engineering Technology program who have maintained a superior level of achievement and who wish to continue their academic studies may be qualified to enter the part-time or full-time program leading to the Bachelor of Science in Engineering. For further information contact the Lincoln College office at 219 Hayden Hall, telephone 437-2500.

**INTERDISCIPLINARY ENGINEERING AND
SCIENCE TECHNOLOGY PROGRAMS**

These programs offered by Lincoln College present a variety of interdisciplinary combinations of the Engineering Technology Programs and the Science Programs (chemistry, physics, and mathematics). They have been developed to meet the need for technologists in the areas of ecology, bioelectronic devices, computer systems, and other technological applications requiring an expertise in several of the academic disciplines.

This demand for multi-skilled technologists reflects the increased reliance of society on the science and engineering technologist to help solve it's growth problems. Opportunities are also developing in the highly interdisciplinary fields such as ocean engineering, bioengineering, environmental science, and public health.

The programs are designed to prepare the student to meet the charge of interfacing technology and society. The engineering technology student not only learns about the disciplines that are related to his expertise but he also becomes oriented in the disciplines where his technological skills will be applied. A program of concentrated study in chemistry and physics or mathematics and physics is offered to the science technology student.

Lincoln College is also offering an Associate in Science Degree Program in Fire Technology which offers a broad spectrum of those science technologies which are basic in coping with fire fighting problems attendant to the complexities of todays society.

Interdisciplinary Engineering and Science Technology Programs offered to Lincoln College Students are:

Associate in Science Degree

Chemical-Physical Technology	page 89
Mathematical-Physical Technology	page 90
Fire Technology	page 91

Associate in Engineering Degree

Bioelectronic Engineering Technology	page 92
Computer Engineering Technology	page 93

Post-Associate Degree Certificate

Control Systems Engineering Technology	page 94
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Bachelor of Engineering Technology Degree

Environmental Control Technology	pages 95-96
Mechanical-Structural Engineering Technology	pages 97-98

Chemical-Physical Technology*Leading to the Degree of Associate in Science*

The program in Chemical-Physical Technology prepares the graduate to assume responsibilities related to the analysis, synthesis, and production of products involving chemical as well as physical changes. The curriculum provides both theoretical and laboratory training in the traditional branches of chemistry but also includes modern instrumental, radiochemistry, and nuclear technology. It provides broad rather than specialized training so as to have applicability in many chemistry-related fields. Employment opportunities are in manufacturing and pharmaceutical plants producing drugs, oils, synthetics, and plastics; as well as in private and industrial research laboratories concerned with the development of processes, by-products, and new knowledge.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.304, 11.305, 11.306	General Physics I, II, III	6
12.544, 12.545, 12.546	General Chemistry I, II, III	6
12.547, 12.548, 12.549	General Chemistry Lab. I, II, III	3

Second Year

10.321, 10.322, 10.323	Calculus II, III, IV	6
12.521, 12.522, 12.523	Analytical Chemistry I, II, III	6
12.524, 12.525, 12.526	Analytical Chemistry Lab. I, II, III	6
30.601, 30.602	Composition and Rhetoric I, II	4
	English Elective	2

Third Year

12.531, 12.532, 12.533	Organic Chemistry I, II, III	6
12.534, 12.535, 12.536	Organic Chemistry Lab. I, II, III	6
11.331, 11.332, 11.333	Modern Physics I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6

Fourth Year

12.541, 12.542, 12.543	Physical Chemistry I, II, III	6
12.551, 12.552, 12.553	Instrumental and Radiochemistry	6
04.381, 04.382, 04.383	Nuclear Technology I, II, III	6
	Elective I, II, III	6

Total A.S. degree 99

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

Mathematical-Physical Technology*Leading to the Degree of Associate in Science*

The program in Mathematical-Physical Technology is designed to establish a firm background in the concepts of physics and mathematics with sufficient chemistry to allow effective communication between technologist and professional. The intensity of courses introduces theoretical depth for concept development but places emphasis at the level of application and performance.

Graduates may serve as high-level technicians and laboratory assistants in such fields as environmental and space science. Working with the professional engineer or scientist, he may assist in performing intricate and detailed experiments; collect, organize, and reduce technical data to manageable form for analysis; or perform investigations requiring mathematical and scientific backgrounds. Opportunities exist in the wide spectrum of research and development organizations which deal in the physical, mathematical, and engineering sciences.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year		
Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12
Second Year		
10.321, 10.322, 10.323	Calculus II, III, IV	6
11.321, 11.322, 11.323	Wave Phenomena, Semiconductor Physics, Semiconductor Devices	6
12.544, 12.545, 12.546	General Chemistry I, II, III	6
12.547, 12.548, 12.549	General Chemistry Lab. I, II, III	3
30.661, 30.602	Composition & Rhetoric I, II	4
	English Elective	2
Third Year		
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
10.324, 10.325, 10.326	Differential Equations I, II, III	6
03.307, 03.308, 03.309	Electricity & Electronics I, II, III	6
	Technical Elective I, II, III	6
Fourth Year		
10.351, 10.352, 10.353	Advanced Mathematics I, II, III	6
11.331, 11.332, 11.333	Modern Physics I, II, III	6
11.373, 11.374, 03.323	Physics Laboratory I, II, Electronics Lab.	6
	Elective I, II, III	6
Total A.S. degree		99

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

Fire Technology*Leading to the Degree of Associate in Science*

The program in Fire Technology is designed to prepare students to assume responsibilities in such areas as fire investigation, industrial fire prevention and protection, and residential fire safety and prevention. A broad array of engineering technologies is an integral part of the student's program as a preparation for coping with new building techniques, present day industrial operations, and the related complexities of the fire services.

The curriculum includes 72 quarter hours of credit in science and mathematics including physics, chemistry, and basic engineering courses. The balance of 24 quarter hours is made up of professional courses taught by specialists in this field bringing to the program a real insight in fire science technology.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or Basic Mathematics I and II courses (10.330 and 10.331). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.327, 10.328, 10.329	Mathematics I, II, III	6
11.304, 11.305, 11.306	General Physics I, II, III	6
91.301, 91.302	Fire Protection Science, I, II	4
91.303	Chemical Behavior of Fire	2
12.507, 12.508, 12.509	Modern Chemistry I, II, III	6

Second Year

02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
10.320, 10.321, 10.322	Calculus I, II, III	8
02.341, 02.342, 02.343	Materials I, II, III	6
91.304, 91.305	Fire Prevention I, II	4

Third Year

01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
02.351	Thermodynamics I	2
03.344	Fundamentals of Electricity and Residential Power Circuits	2
03.345	Industrial Power Circuits	2
91.306, 91.307, 91.308	Fire Protection Systems I, II, III	6

Fourth Year

01.351	Environmental Engineering	2
09.311, 09.312	Engineering Graphics I, II	4
04.381, 04.382	Nuclear Technology I, II	4
91.312	Environmental Physiology	2
45.570, 45.571, 45.572	Electronic Data Processing I, II, III	6
91.309, 91.310, 91.311	Fire Operations I, II, III	6

Total A.S. degree 96

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

Bioelectronic Engineering Technology*Leading to the Degree of Associate in Engineering*

The program in Bioelectronics Engineering Technology prepares the graduate to assume responsibilities related to the design, installation, and operation of modern medical electronic devices used in the measurement, recording, and analysis of anatomical, physiological, and biochemical functions in humans and animals. The curriculum builds heavily on electronics theory, chemistry, and human physiology with emphasis on typical bioelectronic devices and their laboratory applications. Employment opportunities are in biological, chemical, physiological, and pharmaceutical research laboratories; in clinics and hospital in relation to medical diagnosis and patient care; as well as in industrial organizations concerned with the design, development, and production of the equipment.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra and Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

03.301, 03.302, 03.303	Circuit Theory I, II, III	6
09.307, 09.308, 09.309	Electrical and Electronic Graphics, I, II, III	6
10.321, 10.322, 10.323	Calculus, II, III, IV	6
12.507, 12.508, 12.509	*Modern Chemistry I, II, III	6

Third Year

03.304, 03.306, 03.323	Circuit Theory IV, Electrical Measurements and Electronic Lab.	6
11.320	Semiconductor Physics and Devices	4
03.311, 03.312	Electronics I, II	8
18.507, 18.508, 18.509	Gross Anatomy and General Physiology I, II, III	6

Fourth Year

03.351, 03.352, 03.353	Bioelectronic Devices I, II, III	6
03.357, 03.358, 03.359	Bioelectronic Lab. I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
	Technical Elective	6

Total A.E. degree 96

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

*Student may elect to substitute 12.544, 12.545, 12.546 General Chemistry and 12.547, 12.548, 12.549 General Chemistry Laboratory I, II, III (9 q.h.)

Computer Engineering Technology*Leading to the degree of Associate in Engineering*

The Computer Engineering Technology program is organized to provide the mathematical and technological background for understanding both the hardware and software aspects of computer systems. Graduates will be prepared as: a) programmers who translate engineering or scientific concepts into meaningful form for the computer; b) engineering technicians concerned with the development, specification, production, and operation of computer hardware; and c) applications technicians dealing with the interface of the computer with industrial process and control systems or data acquisition, reduction, and display systems.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

10.321, 10.322, 10.323	Calculus II, III, IV	6
03.301, 03.302, 03.303	Circuit Theory I, II, III	6
09.307, 09.308, 09.309	Electrical & Electronic Graphics I, II, III	6
09.351, 09.352, 09.353	Princ. of Computer Programming I, II, III	6

Third Year

11.320	Semiconductor Physics & Devices and	4
03.311, 03.312	Electronics I, II	8
09.354, 09.355, 09.356	Computer Systems I, II, III	6
10.324, 10.325, 10.326	Differential Equations I, II, III	6

Fourth Year

03.323, 03.391, 03.392	Electronic Lab & Computer Technology Lab II, III	6
03.371, 03.372, 03.373	Analog, Digital and Hybrid Comps. I, II, III	6
	Any 2 of 4	
03.387, 03.388, 03.389	Active Integrated Circuits I, II, III	6
09.357, 09.358, 09.359	Computer Aided Design I, II, III	6
09.361, 09.362, 09.363	Computer Controlled Systems I, II, III	6
10.351, 10.352, 10.353	Advanced Mathematics I, II, III	6

Note: Associate degree graduates may transfer applicable credits toward the requirements in other Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degree.

Control Systems Engineering Technology*Leading to a Certificate*

The program in Control Systems Engineering Technology is designed to provide electrical and electronic background required in the development of control equipment and systems related to the age of automation. Practicing engineers who wish to avoid technological obsolescence may keep abreast of current control practices. The program presumes graduation from either Associate in Engineering degree programs in Electrical Power or Electronic Engineering Technology or bachelor degree programs in a branch of engineering. A certificate will be awarded upon completion of 30 quarter hours of credit and a minimum overall Q.P.A. requirement of 1.8 in Lincoln College.

Required Courses

Course Number	Course	Q.H.
03.361, 03.362, 03.363	Transients in Linear Systems I, II, III	6
10.324, 10.325, 10.326	Differential Equations I, II, III	6

Full Year Elective Sequences

(Require completion of Transients in Linear Systems)

03.364, 03.365, 03.366	Advanced Circuit Theory I, II, III	6
03.367, 03.368, 03.369	Advanced Pulse and Digital Circuits I, II, III	6
03.371, 03.372, 03.373	Analog, Digital, and Hybrid Computers I, II, III	6
03.374, 03.375, 03.376	Digital Systems I, II, III	6
03.377, 03.378, 03.379	Control Systems I, II, III	6
03.381, 03.382, 03.383	Transistor Circuit Engineering I, II, III	6
03.384, 03.385, 03.386	Microwave Semiconductor Devices and Circuits I, II, III	6
03.387, 03.388, 03.389	Active Integrated Circuits I, II, III	6
03.314, 03.315, 03.316	Pulse and Digital Circuits I, II, III	6

Environmental Control Technology*Leading to the degree of Bachelor of Engineering Technology*

This program is designed to meet the increasing demand for qualified manpower to operate and maintain facilities and services which relate to the control of our environment. From air-sampling to water treatment and industrial waste control, graduates will take important positions now waiting to be filled.

The program is unique in its mixture of physical and physiological sciences. In addition, the student has the option of selecting technical electives which are oriented toward physical facilities or the study of the user of the facilities — man.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trig. I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

30.601, 30.602	*Composition & Rhetoric I, II	4
18.511, 18.512, 18.513	Biology I, II, III	12
12.544, 12.545, 12.546	Gen. Chemistry I, II, III	6
12.547, 12.548, 12.549	Gen. Chem. Lab. I, II, III	3

Third Year

12.521, 12.522, 12.523	Analytical Chem., I, II, III	6
18.521, 18.522, 18.523	Microbiology I, II, III	12
02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6

Fourth Year

01.380, 01.381, 01.382	Environmental Lab. I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Prog. I, II, III	6
01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
23.501, 23.502, 23.503	**Western Civilization I, II, III	6

Fifth Year

10.321, 10.322, 10.323	Calculus II, III, IV	6
09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
18.561, 18.562, 18.563	Ecology I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6

*30.603 Composition and Rhetoric (Intensive) may be substituted for 30.601, 30.602 Composition and Rhetoric I, II.

**23.509, 23.510 Western Civilization A, B (6 q.h.) may be substituted for 23.501, 23.502, 23.503 Western Civilization I, II, III.

Sixth Year

39.501, 39.502, 39.503	Economic Principles & Prob. I, II, III	6
02.341, 02.342, 02.343	Materials I, II, III	6
18.524, 18.525, 18.526	} Tech. Elective { Human Anat. & Physiology, or Structural Analysis	9
01.324, 01.325, 01.326		6
	LA Elective	6

Seventh Year

Course Number	Course	Q.H.
01.383, 01.384, 01.385	Public Health Engineering I, II, III	6
02.351, 02.352, 02.353	} Tech. Elective { Thermodynamics or Design of Structures	6
01.331, 01.332, 01.333		6
	LA Elective	6

Eighth Year

01.386, 01.387, 01.388	Environmental Design I, II, III	6
02.357, 02.358, 02.359	} Tech. Elective { Heat Engineering or Reinf. Concrete Design	6
01.371, 01.372, 01.373		6
	LA Elective	6

Total B.E.T. Degree 181 or 184

Transfer students may petition for elective credits for courses that are suitable to the curriculum.

Graduates of the Bachelor of Engineering Technology program desiring to pursue programs leading to the Bachelor of Science in Engineering degree at Northeastern University may apply through the Admissions Department (150 RI). Programs in Electrical, Civil, and Mechanical Engineering are available on a part-time as well as a regular cooperative program. Industrial and Chemical Engineering programs are available only during the regular day programs.

Candidates must have at least a 2.75 cumulative average and complete a course program prescribed by the major department and the Dean's Office.

Mechanical-Structural Engineering Technology

(Candidate for Accreditation by Engineers' Council for Professional Development subject to annual review)

Leading to the Degree of Bachelor of Engineering Technology

The program in Mechanical-Structural Engineering Technology is interdisciplinary in that it prepares the graduate to assume responsibilities related to both the planning and construction of relatively static structures such as buildings, bridges, docks, etc., and also the design and production of dynamic machine tools, machinery, and other mechanical devices. The mechanical and structural content are integrated so as to be complementary and to provide a broad base for design problems of great variety. Employment opportunities lie in the architectural, construction, civil, and mechanical professions and companies.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Introductory Mathematics I and II courses (10.301 and 10.302). The Mathematics Placement Test must be taken prior to registration.

First Year

Course Number	Course	Q.H.
10.307, 10.308	College Algebra & Trigonometry I, II	8
10.320	Calculus I	4
11.317, 11.318, 11.319	Physics I, II, III	12

Second Year

09.311, 09.312, 09.313	Engineering Graphics I, II, III	6
09.351, 09.352, 09.353	Principles of Computer Programming I, II, III	6
10.321, 10.322, 10.323	Calculus II, III, IV	6
30.601, 30.602	*Composition and Rhetoric I, II	4
	English Elective	2

Third Year

01.301, 01.302, 01.303	Surveying I, II, III	6
02.301, 02.302, 02.303	Mechanics (Statics) I, II, III	6
09.314, 09.315, 09.316	Engineering Design I, II, III	6
	**Elective I, II, III	6

Fourth Year

01.321, 01.322, 01.323	Introduction to Structures I, II, III	6
02.304, 02.305, 02.306	Mechanics (Dynamics) I, II, III	6
02.321, 02.322, 02.323	Stress Analysis I, II, III	6
23.501, 23.502, 23.503	†Western Civilization I, II, III	6

*30.603 Composition and Rhetoric (Intensive) may be substituted for 30.601, 30.602 Composition and Rhetoric I, II.

**Before registering for any electives, the student should submit a proposed program of elective courses — preferably representing a minor field of concentration consistent with his personal career objectives — for approval by the Academic Standing Committee.

10.324, 10.325, 10.326. Differential Equations I, II, III is recommended for all students planning advanced engineering technology subjects.

†23.509, 23.510 Western Civilization A, B may be substituted for 23.501, 23.502, 23.503 Western Civilization I, II, III.

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Fifth Year

01.324, 01.325, 01.326	Structural Analysis I, II, III	6
01.341, 01.342, 01.343	Fluid Mechanics I, II, III	6
02.341, 02.342, 02.343	Materials I, II, III	6
39.501, 39.502, 39.503	Economic Principles and Problems I, II, III	6

Sixth Year

01.331, 01.332, 01.333	Design of Structures I, II, III	6
02.324, 02.325, 02.326	Advanced Stress Analysis I, II, III	6
19.501, 19.502, 19.503	*Psychology I, II, III	6
	**Elective I, II, III	6

Seventh Year

01.371, 01.372, 01.373	Reinforced Concrete Design I, II, III	6
02.327, 02.328, 02.329	Mechanical Design I, II, III	6
	**Elective I, II, III	6

Eighth Year

02.331, 02.332, 02.333	Mechanical Technology Lab. I, II, III	6
30.604, 30.605	†Introduction to Literary Forms I, II	4
	English Elective	2
	**Elective I, II, III	6

Total B.E.T. degree 180

Suggested Technical Electives

01.361, 01.362, 01.363	Materials and Soil Mechanics	6
02.337, 02.338, 02.339	Mechanical Vibrations I, II, III	6
01.327, 01.328, 01.329	Advanced Structural Analysis I, II, III	6
02.351, 02.352, 02.353	Thermodynamics I, II, III	6

Elective courses for which proper preparation exists may be chosen from within or outside of the Mechanical — Structural Engineering discipline.

Transfer students may petition for elective credits for courses that are suitable to the curriculum.

Graduates of the Bachelor of Engineering Technology Program desiring to pursue programs leading to the Bachelor of Science in Engineering degree at Northeastern University may apply through the Admissions Department (153 RI). Programs in Electrical, Civil, and Mechanical Engineering are available on a part-time as well as a regular cooperative program. Industrial and Chemical Engineering programs are available only during the regular day programs.

Candidates must have at least a 2.75 cumulative average and complete a course program prescribed by the major department and the Dean's Office.

*19.508, 19.509 Fundamentals of Psychology I, II (8 q.h.) may be substituted for 19.501, 19.502, 19.503 Psychology I, II, III.

**Before registering for any electives, the student should submit a proposed program of elective courses — preferably representing a minor field of concentration consistent with his personal career objectives — for approval by the Academic Standing Committee.

10.324, 10.325, 10.326 Differential Equations I, II, III is recommended for all students planning advanced engineering technology subjects.

†30.606 Introduction to Literary Forms (Intensive) may be substituted for 30.604, 30.605 Introduction to Literary Forms I, II.

description of courses

On the pages which follow is a numerical and descriptive listing of courses offered in the several curricula of Lincoln College. Although not all courses are offered every year, all will be offered during the normal period of each student's curriculum. The term "prerequisite" indicates a course that must be taken before undertaking the advanced course to which it applies.

A "quarter hour" equals approximately three clock hours of work (ordinarily, one hour of class and two hours of preparation a week for a quarter of 12 weeks' duration). Laboratory and drawing courses normally require fewer hours of outside preparation and therefore carry less credit than lecture courses.

Abbreviations

prereq. — prerequisite
coreq. — corequisite
cl. — class hours

lab. — laboratory hours
q.h. — quarter hours

Policy on Changes of Program

Lincoln College reserves the right to cancel, modify, or add to the courses offered or to change the order or content of courses in any curriculum.

The University further reserves the right to change the requirements for graduation, tuition, and fees charged, and other regulations. However, no change in tuition and fees at any time shall become effective until the school year following that in which it is announced.

Any changes which may be made from time to time relative to the above policy shall be applicable to all students in the school, college, or department concerned, including former students who may re-enroll.

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	<i>New General Interest Courses</i>	151-152

CIVIL ENGINEERING TECHNOLOGY

01.301 Surveying I (2 cl., 2 q.h.)

Surveying principles; theory of measurements; basic traverse computation. *Preq.* 10.308.

01.302 Surveying II (2 cl., 2 q.h.)

Stadia principles and topography; simple, compound, and vertical curves. *Pre-req.* 01.301.

01.303 Surveying III (2 cl., 2 q.h.)

Spiral easement curves, earthwork computations; solution of the mass diagram. *Prereq.* 01.302.

01.304 Advanced Surveying I (1 cl., 2 lab., 2 q.h.)

Introduction to observations for latitude, time azimuth including basic spherical trigonometry. *Prereq.* 01.303.

01.305 Advanced Surveying II (1 cl., 2 lab., 2 q.h.)

Precise leveling, triangulation and base line measurements. Use of the geodimeter and tellurometer. *Prereq.* 01.304.

01.306 Advanced Surveying III (1 cl., 2 lab., 2 q.h.)

Basic principles of photogrammetry and map making from aerial photographs. Map projections. *Prereq.* 01.305.

01.307 Legal Aspects of Surveying I (2 cl., 2 q.h.)

Surveyor as an expert witness with emphasis on his knowledge of measurements; easements. Registry of Deeds procedure and how land is sold. *Prereq.* 01.303.

01.308 Legal Aspects of Surveying II (2 cl., 2 q.h.)

Deeds and their essential elements, descriptions, and water rights. *Prereq.* 01.307.

01.309 Legal Aspects of Surveying III (2 cl., 2 q.h.)

Land court procedure and the subdivision control law. *Prereq.* 01.308.

01.310 Surveying (2 cl., 2 q.h.)

An outdoor course in use of level, level circuit, vertical control, use of the transit, taping exercises, closed traverse — transit-tape, horizontal control, topography — stadia and plane table, layout problems, horizontal and vertical curves, spiral easements. *Prereq.* 01.303 (Summer Session).

01.311 Highway Engineering I (2 cl., 2 q.h.)

Engineering considerations in the planning and construction of modern highways and highway routing. *Prereq.* 01.301.

01.312 Highway Engineering II (2 cl., 2 q.h.)

Rates of grade, superelevation, flexible and rigid pavements, and other features of highway design. *Prereq.* 01.311.

01.313 Highway Engineering III (2 cl., 2 q.h.)

Traffic flow and traffic control. Computer applications to transportation problems. *Prereq.* 01.312.

01.321 Introduction to Structures I (1 cl., 2 lab., 2 q.h.)

Framing plans and details for steel structures. *Prereq.* 09.313 and 02.303.

01.322 Introduction to Structures II (1 cl., 2 lab., 2 q.h.)

Structural shop drafting and the evaluation of load capacities of rivets, welds, and bolts for structural connections using the AISC code. *Prereq.* 01.321.

01.323 Introduction to Structures III (1 cl., 2 lab., 2 q.h.)

Design and detailing of joints including standard connections, seats, and brackets. *Prereq.* 01.322.

01.324 Structural Analysis I (2 cl., 2 q.h.)

Reactions, shears, bending moments, and forces developed by loads on beams and trusses. Analytical and graphical methods. *Prereq.* 02.323.

01.325 Structural Analysis II (2 cl., 2 q.h.)

Influence lines for beams, girders, and trusses. Solutions for forces from moving load systems on statically determinate structures. *Prereq.* 01.324.

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01.326 Structural Analysis III (2 cl., 2 q.h.)

Introduction to classical methods of deflection solutions of beams and trusses. Methods of solving statically indeterminate structures. *Prereq.* 01.325.

01.327 Advanced Structural Analysis I (2 cl., 2 q.h.)

Analysis of indeterminacy and instability. Analysis of statically indeterminate structures using Castigliano, virtual work, methods of deflections, and the neutral point methods. *Prereq.* 01.326.

01.328 Advanced Structural Analysis II (2 cl., 2 q.h.)

Analysis of statically indeterminate structures using the column analogy, moment, area, elastic weights, and conjugate structures. *Prereq.* 01.327.

01.329 Advanced Structural Analysis III (2 cl., 2 q.h.)

Analysis of statically indeterminate structures using Williot-Mohr, slope deflection, and moment distribution. *Prereq.* 01.328.

01.331 Design of Structures I (2 cl., 2 q.h.)

Design of steel members in structural frames. Tension, compression, bending, and eccentrically loaded members. *Prereq.* 01.323 and 02.323.

01.332 Design of Structures II (2 cl., 2 q.h.)

Design of plate girders, highway bridge decks, and roof framing systems. *Prereq.* 01.331.

01.333 Design of Structures III (2 cl., 2 q.h.)

Composite design in bridges and buildings. Introduction to plastic design methods in steel. *Prereq.* 01.332.

01.334 Advanced Structural Design I (2 cl., 2 q.h.)

Design of continuous frames in structural steel, moment resistant connections, and column bases. *Prereq.* 01.326, 01.333, 01.373.

01.335 Advanced Structural Design II (2 cl., 2 q.h.)

Design of continuous frames in reinforced concrete. Introduction to prestressed concrete member design. *Prereq.* 01.334.

01.336 Advanced Structural Design III (2 cl., 2 q.h.)

Design of foundations for structures. Spread footings, combined footings, mats and pile foundations. *Prereq.* 01.335.

01.341 Fluid Mechanics I (2 cl., 2 q.h.)

Hydrostatics; principles governing fluids at rest; pressure measurement; hydrostatic forces on submerged areas and objects; simple dams; fluids in moving vessels; hoop tension. *Prereq.* 02.303.

01.342 Fluid Mechanics II (2 cl., 2 q.h.)

Fluid dynamics; kinematics of flow; continuity, momentum, and energy equations; orifices; pi theorem; laminar and turbulent flow. *Prereq.* 01.341.

01.343 Fluid Mechanics III (2 cl., 2 q.h.)

Flow in closed conduits using Moody diagram; empirical formulae for closed conduit flow; minor losses; compound pipe systems; open channel flow and Manning formula; specific energy and stage relationships; fluid measurement systems. *Prereq.* 01.342.

- 01.351 Environmental Engineering** (2 cl., 2 q.h.)
Principles of water supply engineering; population forecasting, quality and quantity of water for various uses. Water-treatment processes. *Prereq.* 01.343 and 12.546 or 12.509.
- 01.352 Environmental Engineering II** (2 cl., 2 q.h.)
Collection and disposal of sewage and storm water. Modern methods of treatment and sewage-plant operation. *Prereq.* 01.351.
- 01.353 Environmental Engineering III** (1 cl., 2 lab., 2 q.h.)
Layout and design of water-treatment and sewage treatment plants. Instrumentation and electrical equipment. *Prereq.* 01.352.
- 01.361 Materials and Soil Mechanics I**
Physical properties of Portland cement, aggregates, mixing water, and admixtures. Proportioning of batches. Mixing, placing, and finishing of concrete. Bituminous materials. *Prereq.* 02.303.
- 01.362 Materials and Soil Mechanics II**
Index properties, soil moisture, and structure. Compressibility, theory of consolidation. *Prereq.* 01.361.
- 01.363 Materials and Soil Mechanics III**
Shearing strength of soils, stress analysis, settlement calculations. Lateral earth pressures, bearing capacity of shallow footings. Soil compaction, stabilization and site investigation. *Prereq.* 01.362.
- 01.364 Materials & Soil Mechanics Lab.** (2 cl., 2 q.h.)
Grain size analysis, variables in concrete mix, bituminous testing, specific gravity — CBR optimum moisture, direct shear, consolidation, seepage and flow nets, use of triaxial equipment. *Prereq.* 01.363.
- 01.371 Reinforced-Concrete Design I** (2 cl., 2 q.h.)
Design of bending members in reinforced concrete, using elastic and ultimate-strength theories. *Prereq.* 02.323.
- 01.372 Reinforced-Concrete Design II** (2 cl., 2 q.h.)
Design of axially and eccentrically loaded columns by elastic and ultimate strength principles. *Prereq.* 01.371.
- 01.373 Reinforced-Concrete Design III** (2 cl., 2 q.h.)
Reinforced-concrete design of basic structures including consideration of continuity. *Prereq.* 01.372.
- 01.380 Environmental Lab. I** (3 lab., 2 q.h.)
Methods and techniques for the examination of water. Treatment efficiency is included for various types of water treatment.
- 01.381 Environmental Lab. II** (3 lab., 2 q.h.)
Methods and techniques for the examination of wastewater and industrial waste discharges. Both chemical and bacteriological analysis are included.
- 01.382 Environmental Lab. III** (3 lab., 2 q.h.)
Advanced methods of measuring impurities in air, water, and solid waste discharges.

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01.383 Public Health Engineering I (2 cl., 2 q.h.)

The principles and practice of public health engineering. Administrative and legal aspects of public health quality control.

01.384 Public Health Engineering II (2 cl., 2 q.h.)

Standard methods employed in public health evaluations of foods, dairy products, drinking water, shellfish, air, and recreational waters.

01.385 Public Health Engineering III (2 cl., 2 q.h.)

Engineering control of air pollution, refuse disposal, institutional sanitation, insect vectors, and rodent control.

01.386 Environmental Design I (2 cl., 2 q.h.)

Lecture and design problems in environmental quality, water resources, and waste treatment.

01.387 Environmental Design II (2 cl., 2 q.h.)

Lecture and design problems in wastewater treatment, chlorination, and water pollution control.

01.388 Environmental Design III (2 cl., 2 q.h.)

Lecture and design problems in air pollution control, solid waste disposal, and industrial waste disposal.

01.390 Construction Administration (2 cl., 2 q.h.)

Contract, specifications, and bidding procedures; estimating and scheduling, including the critical path method. Discussion of personnel administration and union negotiation. *Prereq. none.*

01.393 Architectural Design I (2 cl., 2 q.h.)

Study of proportion, composition, planning techniques, and spatial organization. *Prereq. 09.313.*

01.394 Architectural Design II (2 cl., 2 q.h.)

Orientation of structures, site organization, selection of building materials, and consideration of the building process. *Prereq. 01.398.*

01.395 Architectural Design III (2 cl., 2 q.h.)

Basic architectural design projects assigned by the instructor. *Prereq. 01.394.*

01.401 Technology of Modern Architecture I (2 cl., 2 q.h.)

General background of architectural styles both historical and contemporary with emphasis on engineering design aspects and construction procedures of various types of buildings. *Prereq. none.*

01.402 Technology of Modern Architecture II (2 cl., 2 q.h.)

Contemporary architecture, emphasizing the engineering design aspects and construction procedures required for modern buildings. *Prereq. none.*

MECHANICAL ENGINEERING TECHNOLOGY

02.301 Mechanics (Statics) I (2 cl., 2 q.h.)

Forces, moments, couples, statics of particles, and rigid bodies in two and three dimensions. *Prereq. 10.320 and 11.317.*

02.302 Mechanics (Statics) II (2 cl., 2 q.h.)

Distributed forces — external and internal. First moments and centroids. Analysis of structures — trusses, frames, and machines. *Prereq.* 2.301.

02.303 Mechanics (Statics) III (2 cl., 2 q.h.)

Friction, second moments, and virtual work. *Prereq.* 02.302.

02.304 Mechanics (Dynamics) I (2 cl., 2 q.h.)

Kinematics of particles — rectilinear and curvilinear motion of dynamic particles — force, mass and acceleration, work and energy. *Prereq.* 02.303.

02.305 Mechanics (Dynamics) II (2 cl., 2 q.h.)

Impulse and momentum of particles. Kinematics and dynamics of rigid bodies — force mass and acceleration. *Prereq.* 02.304.

02.306 Mechanics (Dynamics) III (2 cl., 2 q.h.)

Dynamics of rigid bodies — work and energy, impulse and momentum. Introduction to mechanical vibration. *Prereq.* 02.305.

02.307 Mechanics Statics (4 cl., 4 q.h.)

Forces, moments, couples, statics of particles, and rigid bodies in three dimensions. Distributed forces — external and internal. First moments and centroids. Analysis of structures, second moments, and virtual work. *Prereq.* 10.320 and 11.317.

02.321 Stress Analysis I (2 cl., 2 q.h.)

Stress and deformation; mechanical properties of materials; allowable stresses and factor of safety; axially loaded indeterminate members; effects of temperature on stresses and strains; thin cylinders and spheres. Riveted and welded joints. *Prereq.* 02.303.

02.322 Stress Analysis II (2 cl., 2 q.h.)

Shear and bending moment in beams; stresses in beams; design of beams; curvature of beams. *Prereq.* 02.321.

02.323 Stress Analysis III (2 cl., 2 q.h.)

Determinate and indeterminate beam deflections and reactions by numerical and graphical integration and area moment methods; theorem of three moments. *Prereq.* 02.322.

02.324 Advanced Stress Analysis I (2 cl., 2 q.h.)

Torsional stresses and strains; power transmission; eccentric loads on struts, beams, riveted and welded joints; combined stresses, principal stresses, Mohr's circle; theories of failure. *Prereq.* 02.323.

02.325 Advanced Stress Analysis II (2 cl., 2 q.h.)

Curved beams; non-symmetrical bending of beams; shear-center and shear stresses on thin sections; composite beams. *Prereq.* 02.324.

02.326 Advanced Stress Analysis III (2 cl., 2 q.h.)

Columns; energy absorption and resilience; dynamic loading; deflection of beams by energy methods. Bolted fastenings. *Prereq.* 02.324.

02.327 Mechanical Design I (2 cl., 2 q.h.)

Introduction and principles of design, properties and selection of materials; stress concentrations; strength under combined stresses; theories of failure; impact and fluctuating and repeated loads. *Prereq.* 02.306, 02.323.

02.328 Mechanical Design II (2 cl., 2 q.h.)

Stresses, deformation and design of fasteners, screws, joints, springs, and bearings. Lubrication and journal bearings. *Prereq.* 02.327.

02.329 Mechanical Design III (2 cl., 2 q.h.)

Stresses and power transmission of spur, bevel, and worm gear; shaft design; clutches, and brakes. *Prereq.* 02.327.

02.331 Mechanical Technology Laboratory I (3 lab., 2 q.h.)

Experiments concerning the physical properties of materials. Instrumentation and measurement. *Prereq.* 02.343, 02.324 or concurrently.

02.332 Mechanical Technology Laboratory II (3 lab., 2 q.h.)

Experiments concerning compressible and incompressible fluids. Experimental techniques. *Prereq.* 02.331, 01.341.

02.333 Mechanical Technology Laboratory III (3 lab., 2 q.h.)

Experiments of a more advanced nature. Introduction to the analog computer and experimental stress analysis. *Prereq.* 02.332, 02.325.

02.334 Experimental Stress Analysis I (2 cl., 2 q.h.)

Theory and experimentation showing the application of extensometers and electrical strain gages as transducers and in the field of experimental stress and strain analysis. *Prereq.* 02.324.

02.335 Experimental Stress Analysis II (2 cl., 2 q.h.)

Theory and laboratory practice of photoelastic methods as applied to classical model analysis and modern coating analysis. *Prereq.* 02.334.

02.336 Experimental Stress Analysis III (2 cl., 2 q.h.)

The use of resinous and ceramic brittle coatings in experimental analysis; Moiré method of strain analysis; statistical treatment of experimental data. *Prereq.* 02.335.

02.337 Mechanical Vibrations I (2 cl., 2 q.h.)

Elements of vibrating systems, one degree of freedom (undamped free and forced vibration from Newton's law of motion and energy methods.) Natural frequencies. Damped free and forced vibration. Impedance and mobility. *Prereq.* 02.306.

02.338 Mechanical Vibrations II (2 cl., 2 q.h.)

Systems with more than one degree of freedom. Influence coefficients, Lagrange's equations, generalized coordinates, vibration absorber. *Prereq.* 02.337.

02.339 Mechanical Vibrations III (2 cl., 2 q.h.)

Natural frequencies by Rayleigh methods and Holzer methods for multi-degree of freedom. Application problems with combined rotation and translation. Laplace transforms and electro-mechanical analogs. *Prereq.* 02.338.

02.341 Materials I (2 cl., 2 q.h.)

Lectures on: fundamental material structures, general information covering theoretical aspects of properties, testing and failure of materials supplemented by visual aids. *Prereq.* none.

02.342 Materials II (2 cl., 2 q.h.)

Lectures on: alloying and hardening of metals, refinement of metals, equilibrium diagrams, characteristics of engineering materials, principles of material fabrication. *Prereq.* 02.341.

02.343 Materials III (2 cl., 2 q.h.)

Lectures on: Inorganic materials, i.e., polymers, glasses, ceramics, cements, wood; and materials having important electrical and magnetic properties, also a summary of the most up-to-date applications for the fabrication and uses of both metals and non-metals. *Prereq.* 02.342.

02.344 Applied Metallurgy I (1 cl., 1 lab., 2 q.h.)

Lectures: Structures of metals, imperfections, phase diagrams, effect of temperature on structure and properties of metals (annealing, recrystallization, recovery, precipitation, diffusion); strengthening mechanisms, mechanical properties of non-ferrous metals.

Laboratory: Experiments in preparation of samples, selection, polishing, and etching; examination of non-ferrous metals; use of the microscope; linear analysis; construction of cooling curves and simple binary phase diagrams. *Prereq.* 02.342.

02.345 Applied Metallurgy II (1 cl., 1 lab., 2 q.h.)

Lectures: Mechanical properties of ferrous metals, the iron carbon diagram, high temperature alloys, hardening methods, impact tests, effects of environment on metals.

Laboratory: Experiments on analysis of stress-strain diagrams of iron and steel, heat treatment of steels, surface corrosion, tempering and drawing, use of metallograph and analysis of the results. *Prereq.* 02.344.

02.346 Applied Metallurgy III (1 cl., 1 lab., 2 q.h.)

Lectures: Manufacturing processes, methods of fabrication; limitations on the use of different materials and processes; casting, welding, cutting, drawing, powder metallurgy.

Laboratory: Experiments in cold rolling, swagging, drawing of non-ferrous metals and the analysis of the results. Tension, shear, fatigue, and machinability tests on ferrous metals. *Prereq.* 02.345.

02.347 Principles of Aerodynamics (4 cl., 4 q.h.)

This is a first course in aerodynamics covering the fundamentals of theory and application. Material presented includes: properties of air, fluid flow principles, lift, drag; air foil and wing theory; Auxiliary lift devices; stability and control; and flight vehicle performance. *Prereq.* 01.343.

02.351 Thermodynamics I (2 cl., 2 q.h.)

General theory of heat and matter; laws of thermodynamics; energy-transformation principles; properties and processes for pure substances. Thermodynamic properties and processes of liquids and vapors; mollier diagram and tables. *Prereq.* 11.318.

02.352 Thermodynamics II (2 cl., 2 q.h.)

Properties and processes for ideal gases. Heat engines, carnot cycle, availability of energy. Tables and charts; vapor power cycles. *Prereq.* 02.351.

02.353 Thermodynamics III (2 cl., 2 q.h.)

Theory of vapor engines and analysis of types of actual engines using compression of gases and vapors; internal combustion engines. Theory of gas and vapor flow through orifices and nozzles. *Prereq.* 02.352.

02.354 Heat Transfer I (2 cl., 2 q.h.)

The primary modes of heat transfer; thermal conductance/resistance concept; thermal-electrical analogy; combined heat transfer mechanisms; basic equations of conduction; thermal conductivity; analytical solutions of various steady state conduction problems. *Prereq.* 02.353.

02.355 Heat Transfer II (2 cl., 2 q.h.)

Dimensional analysis and similarity considerations; natural and forced convection; hydrodynamic and thermal boundary layers; log-mean temperature differences; overall heat transfer coefficients; applications to heat exchangers. *Prereq.* 02.354.

02.356 Heat Transfer III (2 cl., 2 q.h.)

Black body radiation; Kirchoff's Law; emissivity and absorbtivity; radiation between simple bodies. Graphical and numerical methods applied to steady state, conduction problems; radiation and convection effects; transient heat transfer; numerical methods applied to transient problems; heat transfer engineering problems. *Prereq.* 02.355.

02.357 Heat Engineering I (Refrigeration) (2 cl., 2 q.h.)

Principles of gas compression, analysis of vapor compression, refrigeration systems, low temperature refrigeration cycles, and absorption refrigeration systems. *Prereq.* 02.353.

02.358 Heat Engineering II (Air Conditioning) (2 cl., 2 q.h.)

Air conditioning principles including psychometrics and heat pumps. Calculation of heating and cooling loads in accordance with A.S.H.R.A.E. practices. *Prereq.* 02.353.

02.359 Heat Engineering III (Turbines) (2 cl., 2 q.h.)

Design and performance of steam and gas turbines; spark-ignition and compression-ignition engine design and performance, fan performance. *Prereq.* 02.353.

02.361 Heat Technology Laboratory I (3 lab., 2 q.h.)

Experiments illustrating principles thermodynamics and heat transfer. Instrumentation and measurement. *Prereq.* 02.353.

02.362 Heat Technology Laboratory II (3 lab., 2 q.h.)

Experiments on various types of heat engines. Experimental techniques. *Prereq.* 02.361, 02.354 and 02.357.

02.363 Heat Technology Laboratory III (3 lab., 2 q.h.)

Experiments of a more advanced nature further illustrating the principles of thermodynamics and making use of the student's increased theoretical background. Simulation of heat problems on analog computer. *Prereq.* 02.362.

02.401 Man and Materials (2 cl., 2 q.h.)

(See General Interest Courses pages 152-153)

02.411 Mechanics A (4 cl., 4 q.h.)

(Day Curriculum)

Forces, moments, couples, statics of particles and rigid bodies in two and three dimensions. Distributed forces — external and internal. First moments and centroids. Analysis of structures — trusses, frames, and machines. *Prereq.* 10.320, 11.317.

02.412 Mechanics B (4 cl., 4 q.h.) (Day Curriculum)
Friction, second moments, and virtual work. Kinematics of particles — rectilinear and curvilinear motion of dynamic particles — force, mass and acceleration, work and energy. *Prereq.* 02.411.

02.413 Mechanics C (4 cl., 4 q.h.) (Day Curriculum)
Impulse and momentum of particles. Kinematics and dynamics of rigid bodies — force, mass, and acceleration. Dynamics of rigid bodies — work and energy, impulse and momentum. Introduction to mechanical vibration. *Prereq.* 02.412.

02.414 Stress Analysis A (4 cl., 4 q.h.) (Day Curriculum)
Stress and deformation; mechanical properties of materials; allowable stresses and factor of safety; axially loaded indeterminate members; effects of temperature on stresses and strains; thin cylinders and spheres. Riveted and welded joints. Shear and bending moment in beams; stresses in beams; design of beams; curvature of beams. *Prereq.* 02.411.

02.415 Stress Analysis B (3 cl., 4 q.h.) (Day Curriculum)
Determinate and indeterminate beam deflections and reactions by numerical and graphical integration and area moment methods; theorem of three moments. Torsional stresses and strains; power transmission; eccentric loads on struts, beams, riveted and welded joints; combined stresses, principal stresses, Mohr's circle; theories of failure. *Prereq.* 02.414.

02.416 Stress Analysis C (4 cl., 4 q.h.) (Day Curriculum)
Curved beams; non-symmetrical bending of beams; short-center and shear stresses on thin sections; composite beams. Columns; energy absorption and resilience; inertial stresses impact loading; deflection of beams by energy methods. Bolted fastenings. *Prereq.* 02.415.

02.417 Mechanical Design A (4 cl., 4 q.h.) (Day Curriculum)
Failure criteria; properties and selection of materials; manufacturing considerations; stress concentrations; strength under combined stresses; theories of failure; impact; and fluctuating and repeated loads. Stresses, deformation and design of springs; screws, keys, pins, and interference fits; preloading of bolted joints; shafts and flywheels, friction brakes. *Prereq.* 02.415.

02.418 Mechanical Design B (2 cl., 2 q.h.) (Day Curriculum)
Lubrication and journal bearings; anti-friction bearings; stresses and power transmission of spur, bevel, and worm gear; screws for power transmission. *Prereq.* 02.417.

02.421 Thermodynamics A (4 cl., 4 q.h.) (Day Curriculum)
General theory of heat and matter; laws of thermodynamics; energy-transformation principles and availability of energy; properties and processes for pure substances and ideal gases. Thermodynamic properties and processes of liquids and vapors; tables and charts; mixtures of fluids; vapor cycles. *Prereq.* 11.318.

02.422 Thermodynamics B (4 cl., 4 q.h.) (Day Curriculum)
Theory of vapor engines and analysis of types of actual engines using compression of gases and vapors; internal combustion engines. Theory of gas and vapor flow through orifices and nozzles. Design and performance of steam and gas turbines; spark-ignition and compression-ignition engine design and performance. Fan performance. *Prereq.* 02.421.

02.423 Thermodynamics C (4 cl., 4 q.h.) (Day Curriculum)

Air conditioning principles including psychometrics and heat pumps. Calculation of heating and cooling loads in accordance with A.S.H.R.A.E. practices. Principles of gas compression, analysis of vapor compression, refrigeration systems, low temperature refrigeration cycles and absorption refrigeration systems. *Prereq.* 02.422.

02.424 Thermodynamics D (2 cl., 2 q.h.) (Day Curriculum)

The primary modes of heat transfer; thermal conductance/resistance concept; thermal-electrical analog; combined heat transfer mechanisms; basic equations of conduction; thermal conductivity; analytical solutions of various steady state conduction problems. *Prereq.* 02.422.

02.425 Thermodynamics E (4 cl., 4 q.h.) (Day Curriculum)

Dimensional analysis and similarity considerations; natural and forced convection; hydrodynamic and thermal boundary layers; log-mean temperature differences; overall heat transfer coefficients; applications to heat exchangers. Black body radiation; Kirchoff's Law; emissivity and absorptivity; radiation between simple bodies. Graphical and numerical methods applied to steady state, conduction problems; radiation and convection effects; transient heat transfer; numerical methods applied to transient problems; heat transfer engineering problems. *Prereq.* 02.424.

02.431 Materials A (4 cl., 4 q.h.) (Day Curriculum)

Lectures on: fundamental metallic structures, general metallurgical information covering theoretical aspects of properties, testing and failure of metals. Supplemented by visual aids. Lectures on: alloying and hardening of metals, refinement of metals, equilibrium diagrams, characteristics of engineering metals, principles of metal fabrication. *Prereq.* none.

02.432 Materials B (4 cl., 4 q.h.) (Day Curriculum)

Lectures on: Inorganic materials, i.e., polymers, glasses, ceramics, cements, wood; and materials having important electrical and magnetic properties, also a summary of the most up-to-date applications for the fabrication and uses of both metals and non-metals. Structures of metals, imperfections, phase diagrams, effect of temperature on structure and properties of metals, (annealing, recrystallization, recovery, precipitation, diffusion); strengthening mechanisms, mechanical properties of non-ferrous metals.

Laboratory: Experiments in preparation of samples, selection, polishing, and etching, examination of non-ferrous metals, use of the microscope, linear analysis, construction of cooling curves, and simple binary phase diagrams. *Prereq.* 02.431.

02.433 Applied Metallurgy (4 cl., 4 q.h.) (Day Curriculum)

Lectures: Mechanical properties of ferrous metals, the iron carbon diagram, high temperature alloys, hardening methods, impact tests, effects of environment on metals. Manufacturing processes, methods of fabrication; limitations on the use of different materials and processes; casting, welding, cutting, drawing, powder metallurgy.

Laboratory: Experiments on analysis of stress-strain diagrams of iron and steel, heat treatment of steels, surface corrosion, tempering and drawing, use of metallograph and analysis of the results. Experiments in cold rolling, swagging, drawing of non-ferrous metals and the analysis of the results. Tension, shear, fatigue, and machinability tests on ferrous metals. *Prereq.* 02.432.

- 02.441 Fluid Mechanics A** (4 cl., 4 q.h.) (Day Curriculum)
Hydrostatics, principles governing fluids at rest; pressure measurement; hydrostatic forces on submerged areas and objects; simple dams; fluids in moving vessels; hoop tension. Fluid flow in pipes under pressure; fluid energy, power and friction loss; Bernoulli's Theorem; flow measurement. *Prereq.* 02.412.
- 02.442 Fluid Mechanics B** (2 cl., 2 q.h.) (Day Curriculum)
Pipe networks and reservoir systems; flow in open channels; uniform flow; energy, friction loss, minor losses, velocity distribution, alternate stages of flow, critical flow; non-uniform flow; accelerated and retarded flow; hydraulic jump and waves. *Prereq.* 02.441.
- 02.451 Mechanical Vibrations** (4 cl., 4 q.h.) (Day Curriculum)
Elements of vibrating systems, one degree of freedom (undamped free and forced vibration from Newton's law of motion and energy methods.) Natural frequencies. Damped free and forced vibration. Impedance and mobility. Systems with more than one degree of freedom. Influence coefficients, Lagrange's equations, generalized coordinates, vibration absorber. *Prereq.* 02.413.
- 02.452 Experimental Stress Analysis** (4 cl., 4 q.h.) (Day Curriculum)
Theory and experimentation showing the application of extensometers and electrical strain gages as transducers in the field of experimental stress and strain analysis. Theory and laboratory practice photoelastic methods as applied to classical model analysis and modern coating analysis. *Prereq.* 02.415.
- 02.461 Machine Shop** (2 cl., 3 lab. — 4 q.h.) (Day Curriculum)
Introduction to study of machines for metal processing, cutting tools, and fluids. Machinability; automatic machinery. *Prereq.* none.
- 02.462 Mechanical Technology Laboratory I** (3 lab., 2 q.h.) (Day Curriculum)
Experiments concerning the physical properties of materials. Instrumentation and measurement. *Prereq.* 02.431, 02.415, or concurrently.
- 02.463 Mechanical Technology Laboratory II** (3 lab., 2 q.h.) (Day Curriculum)
Experiments concerning compressible and incompressible fluids. Experimental techniques. *Prereq.* 02.462, 02.441.
- 02.464 Mechanical Technology Laboratory III** (3 lab., 2 q.h.) (Day Curriculum)
Experiments of a more advanced nature. Introduction to the analog computer and experimental stress analysis. *Prereq.* 02.463.
- 02.465 Heat Technology Laboratory I** (3 lab., 2 q.h.) (Day Curriculum)
Experiments illustrating principles of thermodynamics and heat transfer. Instrumentation and measurement. *Prereq.* 02.422 or concurrently.
- 02.466 Heat Technology Laboratory II** (3 lab., 2 q.h.) (Day Curriculum)
Experiments on various types of heat engines. Experimental techniques *Prereq.* 02.465; 02.424, or concurrently.
- 02.467 Project Lab.** (6 cl., 4 q.h.) (Day Curriculum)
A project of analytical, design, or experimental nature. Must be approved by student's faculty adviser. A formal report must be submitted. *Prereq.* 02.464; 02.466.

ELECTRICAL ENGINEERING TECHNOLOGY

03.301 Circuit Theory I (2 cl., 2 q.h.)

Ohm's law, Kirchoff's current and voltage laws, equivalent resistances and sources, mesh and nodal analysis, network theorems, and power relations all with respect to direct currents. *Prereq.* 10.320 and 11.319.

03.302 Circuit Theory II (2 cl., 2 q.h.)

Energy storage, singularity functions, response of R, L and C elements to singularities. *Prereq.* 03.301, 10.322 *Concurrently.*

03.303 Circuit Theory III (2 cl., 2 q.h.)

Complex algebra, phasors, frequency domain, mutual inductance, transformers, steady-state a-c theory, driving point and transfer impedances, power and energy in a-c circuits. *Prereq.* 03.302.

03.304 Circuit Theory IV (2 cl., 2 q.h.)

Laplace transforms; partial fraction expansion; Laplace transform techniques applied to the solution of RLC networks. *Prereq.* 03.303.

03.305 Circuit Theory V (2 cl., 2 q.h.)

Consideration of balanced and unbalanced polyphase power circuits; symmetrical components, harmonic analysis. *Prereq.* 03.304.

03.306 Electrical Measurements (2 cl., 2 q.h.)

Measurement of voltage, current, power, resistance, capacitance, inductance, impedance, frequency, etc. Direct and substitution measurements. Evaluation of measured data — standard deviation and tolerance limits, instruments calibrations — effects of residual impedance. *Prereq.* 03.304, 10.323.

03.311 Electronics I (4 cl., 4 q.h.)

Semiconductor diodes, power supplies and filters. Transistors as amplifying devices. Graphical analysis of basic amplifiers, d-c and a-c load lines. Transistor biasing techniques. *Prereq.* 03.303, 11.323 or 11.320.

03.312 Electronics II (4 cl., 4 q.h.)

Small signal low frequency transistor models. A-c equivalent circuits, low frequency amplifier circuits. Frequency effects in audio amplifiers. High frequency transistor model. Voltage regulation. *Prereq.* 03.311.

03.313 Electronics III (4 cl., 4 q.h.)

Continuation of transistor circuits. Untuned amplifiers, feedback amplifiers, low frequency large signal amplifiers. Field effect transistor circuits, and operational amplifiers. *Prereq.* 03.312.

03.314 Pulse and Digital Circuits I (2 cl., 2 q.h.)

Study of wave shaping circuitry including clippers, clampers, slicers, rise time, and sag. Review of semiconductor diodes. Study of the use of the transistor as a switch. Emphasis is placed on the non-linear aspects of transistors including transient switching characteristics. Review of semiconductor diodes. RL networks, introduction to pulse transformers, delay lines and pulse forming networks. *Prereq.* 03.313.

03.315 Pulse and Digital Circuits II (2 cl., 2 q.h.)

Numbering systems; binary notation, and Boolean Algebra. Analysis of integrated OR, AND, NOT, NAND, and NOR circuits including characteristics of various logic families. Study of details of shift register and diode matrix. *Prereq.* 03.314.

03.316 Pulse and Digital Circuits III (2 cl., 2 q.h.)

Multivibrator circuits; bistable, astable, and monostable. Study of counting and timing circuits. Synchronization, voltage and current time-based generators. Analysis of Schmitt trigger and differential comparator circuits. *Prereq.* 03.315.

03.317 Principles of Communication Systems I (4 cl., 4 q.h.)

Analysis of RLC tuned circuits including inductively coupled circuits. A study of class-C tuned power amplifiers. Analysis of RC, LC and quartz crystal oscillators. *Prereq.* 03.313.

03.318 Principles of Communication Systems II (4 cl., 4 q.h.)

Introduction to noise and noise-figure. Discussion of Fourier analysis. Basic theory of amplitude, frequency, and phase-modulated systems is presented. Basic concepts of transmitter and receiver circuits are detailed. Comparison of noise susceptibility of the various systems is examined. *Prereq.* 03.317.

03.319 Principles of Communication Systems III (4 cl., 4 q.h.)

Introduction to pulse communication systems. Basic discussion of sampling systems quantizers, encoders, modulators, transmission paths. Presentation of channel capacity and decoding systems. Error detection systems are compared. *Prereq.* 03.318.

03.320 Electricity and Electronics I (2 cl., 2 q.h.) (not for electrical majors)

Introduction to circuit analysis, resistive networks, periodic excitation function, steady-state a-c circuits. *Prereq.* 11.319.

03.321 Electricity and Electronics II (2 cl., 2 q.h.)

The physical foundation of electronics, physical operation of electronic devices, single-stage electronic circuits. *Prereq.* 03.320.

03.322 Electricity and Electronics III (2 cl., 2 q.h.)

Magnetic circuits and transformers, electron-mechanical energy conversion; d-c machines, a-c machines. *Prereq.* 03.321.

03.323 Electronic Laboratory (3 lab., 2 q.h.)

Experiments dealing with laboratory equipment (meters and oscilloscopes) techniques, junction and field effect transistor characteristics, vacuum and semiconductor diodes, power supplies including the regulated type, silicon controlled rectifiers, resistance-coupled amplifiers using transistors, including feedback methods. *Prereq.* 03.312.

03.324 Circuits Laboratory I (3 lab., 2 q.h.)

Experimentation in electronic circuit theory utilizing various measurement techniques. Instrumentation verification of circuit theorems; response of circuits to steps and impulses; oscilloscope theory and applications. *Prereq.* 03.306.

03.325 Circuits Laboratory II (3 lab., 2 q.h.)

Further experimentation in electrical circuits and measurement techniques. Experiments include non-linear devices, terminal characteristics of active devices, log modulus plots, network parameters and synthesis, Fourier analysis and synthesis. *Prereq.* 03.324.

03.327 Advanced Electronic Laboratory I (3 lab., 2 q.h.)

Experiments dealing with oscilloscopes, class B audio amplifier with transistors, push-pull amplifiers, drivers, and distortion measurements. Double-tuned transformers, video amplifiers, audio frequency oscillators, and square-wave testing of audio amplifiers and the study of operational amplifiers. *Prereq.* 03.323, 03.313.

03.328 Advanced Electronic Laboratory II (3 lab., 2 q.h.)

Experiments dealing with modulation of a class C amplifier, the diode detector, basic timing circuits, RF and crystal oscillators, networks in FM and television equipment, pulse and counter circuits and frequency dividers, sawtooth generators, astable (free-running) multivibrators, logic gates, frequency modulation detectors. *Prereq.* 03.327.

03.329 Advanced Electronic Laboratory III (3 lab., 2 q.h.)

Spectral studies of FM and PM waves, amplitude limiters. The balance modulators and single sideband generators. Binary adders, registers and counters, testing of a radio receiver, television receiver demonstration, analog computers. Pulse forming and delay lines, slotted lines, a series of five microwave experiments, and a series of four digital experiments. *Prereq.* 03.328.

03.331 Energy Conversion I (2 cl., 2 q.h.)

Generalized theory of electromechanical energy conversion. Two-winding transformer; general torque form applied to singly and doubly-excited rotating devices. *Prereq.* 03.303 and 10.323.

03.332 Energy Conversion II (2 cl., 2 q.h.)

Induction and synchronous machines. Equivalent circuit models, steady-state operating modes, applications. *Prereq.* 03.331.

03.333 Energy Conversion III (2 cl., 2 q.h.)

D-c machine; transfer functions and flow chart analysis. Laplace transform techniques applied to the analysis of dynamic operating modes of rotating machines. *Prereq.* 03.332.

03.334 Control Circuits (2 cl., 2 q.h.)*

Basic control design considerations; circuit transfer functions, time and frequency response relationships, bode diagrams. General feedback applications; stability and compensating techniques as related to more complex control systems. *Prereq.* 03.333.

03.335 Control Circuits II (2 cl., 2 q.h.)

Characteristics and construction of common control circuit devices; synchros, choppers, magnetic amplifiers, SCR's, control motors, gear trains, tachometers. *Prereq.* 03.334.

03.336 Control Circuits III (2 cl., 2 q.h.)

System open and closed loop transfer functions; stability, speed of response, and accuracy trade-offs. Industrial uses including speed and voltage regulation, photoelectric, timing, sorting, and temperature control applications. *Pereq.* 03.335.

*03.334, 335, 336 Control Circuits I, II, III not to be offered during the 1974-75 year.

03.337 Basic Power Systems I (4 cl., 4 q.h.)

Consideration of power transmission lines; line constants; current, voltage, and power relations; introduction to electric-power distribution loads, feeders, and substations; application of matrices. *Prereq.* 03.333.

03.338 Basic Power Systems II (4 cl., 4 q.h.)

Consideration of symmetrical and unsymmetrical faults; protective devices — application and coordination; power flow in electric circuits; steady-state power limitations of systems; voltage regulation theory and application. *Prereq.* 03.337.

03.339 Basic Power Systems III (4 cl., 4 q.h.)

Computer applications to power systems with emphasis on load-flow studies; basic ideas of system planning, short-circuit studies and system stability. *Prereq.* 03.338.

03.341 Power and Controls Laboratory I (4 lab., 2 q.h.)*

Experimentation on measurement techniques, basic devices and circuits (including power circuits), transformers. *Prereq.* 03.333 and 03.334 or concurrently.

03.342 Power and Controls Laboratory II (4 lab., 2 q.h.)

Experimentation on the steady-state and dynamic characteristics of rotating machines. *Prereq.* 03.341.

03.343 Power and Controls Laboratory III (4 lab., 2 q.h.)

Experimentation on control devices, systems including transient and steady-state responses, voltage and speed control systems, polyphase power rectifiers. *Prereq.* 03.342.

03.344 Fundamental Electricity and Residential Power Circuits (2 cl., 2 q.h.)

The fundamentals of electrical work, terminology, basic principles and the theory behind general practice in accordance with the National Electric Code are presented with an analysis of the actual wiring of residential buildings and farms. Wiring analysis of non-residential buildings such as churches, schools, stores, etc. for below 600 volts service is also included. *Prereq.* 10.329, 11.306.

03.345 Industrial Power Circuits (2 cl., 2 q.h.)

A survey of the use of sound engineering principles in the design of electric distribution systems which are applicable to most types and sizes of industrial plants. *Prereq.* 03.344.

03.346 Electronics for Industry I (2 cl., 2 q.h.)

Two-terminal devices. Diode rectifiers and filters. Transistors and vacuum tubes. D. C. biasing. *Prereq.* 03.302.

03.347 Electronics for Industry II (2 cl., 2 q.h.)

Small signal analysis. Field effect transistors. Multi-stage systems. Decibel and frequency considerations. Large signal amplifiers. *Prereq.* 03.346.

*03.341, 342, 343 Power Controls Laboratory not to be offered during the 1974-75 year.

03.348 Electronics for Industry III (2 cl., 2 q.h.)

PNPN and other Devices. Differential and operational amplifiers. Regulators and miscellaneous circuit applications. Cathode ray oscilloscope. *Prereq.* 03.347.

***03.351 Bioelectronic Devices I** (2 cl., 2 q.h.)

Transducers, relating body functions and biomedical reactions to electronic signals. Optics and optical components including mirror lenses, prisms, and gratings. Defraction and refraction of light into spectral components and spectra. *Prereq.* 03.312.

***03.352 Bioelectronic Devices II** (2 cl., 2 q.h.)

Operational amplifier design and utilization, special power supply design. Chromatography and design of chromatography systems. Spectrophotometry radiation counting equipment and Ph measurement equipment related to chromatography. The electrocardiograph, electroencephalograph, and related physiological equipment will be discussed. *Prereq.* 03.351.

***03.353 Bioelectronic Devices III** (2 cl., 2 q.h.)

Blood pressure and flow measurement including ultrasonic devices, centrifugation, and ultracentrifugation equipment as well as amino acid analyzers. Nerve-conduction apparatus and techniques. Professional specialists in the field will lecture on special topics. *Prereq.* 03.352.

***03.357 Bioelectronic Laboratory I** (3 lab., 2 q.h.)

Experiments dealing with oscilloscopes, transistor amplifiers with negative feedback, directly coupled and difference amplifiers, clamping circuits, transients, logic circuits. Experiments in electronic circuitry including audio amplifiers, oscillators, and related circuits. *Prereq.* 03.312.

***03.358 Bioelectronic Laboratory II** (3 lab., 2 q.h.)

Experiments in optics covering lenses, mirrors, prisms, gratings, and spectra. Radiation experiments. Special design experiments on the optical bench related to spectrophotometry, experiments with optical and electrooptical system. Design of detection and amplification, monitoring systems. *Prereq.* 03.357.

***03.359 Bioelectronic Laboratory III** (3 lab., 2 q.h.)

Experiments and open discussion centered around bioelectronic systems including electrocardiogram, electroencephalograph, amino acid analyzers, Ph measurement and titration apparatus, centrifuges, and ultracentrifuges as well as radioactive sample changers. *Prereq.* 03.358.

03.360 Introduction to Radar Systems (4 cl., 4 q.h.)

Discussion of radar range equation, examination of CW, FM, MTI, Pulse-Doppler and monopulse systems. Description of transmitter, antennas, and receivers and a discussion of information extraction from typical radar waveforms. *Prereq.* 03.316 and 03.319.

*Bioelectronic Devices (03.351, 03.352, 03.353) and the laboratory sequence (03.357, 03.358, 03.359) are offered every other year.

03.361. Transients in Linear Systems I (2 cl., 2 q.h.)

Application of differential equations to the solutions of linear, time-invariant electrical networks. Introduction to singularity functions, convolution, and time domain transient analysis. *Prereq. 10.324 or concurrently, 03.304 or equivalent.*

03.362 Transients in Linear Systems II (2 cl., 2 q.h.)

Network topology and duality, introduction to the methods of transformation calculus and complex frequency concepts. Signal analysis in the frequency domain. Fourier series, Fourier and Laplace transform methods. *Prereq. 10.325 or concurrently, 03.361.*

03.363 Transients in Linear Systems III (2 cl., 2 q.h.)

A varied selection of circuit problems are solved using Laplace transforms, and related theorems. *Prereq. 03.362.*

03.364 Advanced Circuit Theory I (2 cl., 2 q.h.)

Definitions and tests are lumped, linear, time-invariant systems, review of matrix algebra. General analysis of networks by loop current and node voltage variables using matrix techniques. *Prereq. 03.363.*

03.365 Advanced Circuit Theory II (2 cl., 2 q.h.)

A study of two-port networks using various parameter systems. S-plane analysis of system response. General filter analysis. *Prereq. 03.364.*

03.366 Advanced Circuit Theory III (2 cl., 2 q.h.)

Discussion of the necessary and sufficient conditions for the physical realization of impedance functions; Forster and Cauer forms. Synthesis of filters. *Prereq. 03.365.*

03.367 Advanced Pulse and Digital Circuits I (2 cl., 2 q.h.)

Linear and non-linear pulse forming and processing techniques. Design of gate and binary circuits for operation under severe environmental conditions. *Prereq. 03.363.*

03.368 Advanced Pulse and Digital Circuits II (2 cl., 2 q.h.)

Analysis of applications of existing integrated circuits. *Prereq. 03.367.*

03.369 Advanced Pulse and Digital Circuits III (2 cl., 2 q.h.)

Negative-impedance devices and their applications. Linear voltage and current sweep circuits. *Prereq. 03.368.*

03.371. Analog, Digital and Hybrid Computers I (2 cl., 2 q.h.)

Theory and operation of analog computers. Amplitude scaling and time scaling on the analog computer and application of the analog computer to the solution of linear and non-linear differential equations. *Prereq. 10.325.*

03.372 Analog, Digital and Hybrid Computers II (2 cl., 2 q.h.)

Introduction to the field of digital computer design. Topics include general computer organization, number systems and number representations, design characteristics of major computer units. Boolean Algebra application to computer design. *Prereq. 03.371.*

03.373 Analog, Digital and Hybrid Computers III (2 cl., 2 q.h.)

Survey of the present state-of-the-art hybrid computers. Problem areas unique to hybrid computers such as interface, analog-to-digital and digital-to-analog conversion will also be discussed. Hybrid computer programming techniques. Direct digital process control computers. *Prereq. 03.372.*

03.374 Digital Systems I (2 cl., 2 q.h.)

Basic concepts of Boolean Algebra. Switching components. Review of number systems, codes, and negative number representation. Analysis and synthesis of combinational circuits. Examples of application. *Prereq.* 03.316.

03.375 Digital Systems II (2 cl., 2 q.h.)

Data acquisition techniques. Analysis and synthesis of sequential circuits. Examples of applications. Analog and digital data reduction. Real time data processing. *Prereq.* 03.374.

03.376 Digital Systems III (2 cl., 2 q.h.)

Residue number systems. Threshold logic concepts. Advanced digital system techniques with application to complex systems. Data decommutation techniques relative to communications systems. Aerospace telemetry systems. *Prereq.* 03.375.

03.377 Control Systems I (2 cl., 2 q.h.)

Analysis of linear servomechanisms under both transient and steady-state conditions. Signal flow graphs. *Prereq.* 03.363.

03.378 Control Systems II (2 cl., 2 q.h.)

Laplace transforms used in the formulation of block diagrams and transfer functions. System stability. Root locus techniques. *Prereq.* 03.377.

03.379 Control Systems III (2 cl., 2 q.h.)

Treatment of Nyquist criteria, and Bode diagram methods for systems evaluation. *Prereq.* 03.378.

03.381 Linear Active Circuit Design I (2 cl., 2 q.h.)

Review of large and small signal analysis for bipolar, unipolar, and integrated circuit devices. Review of feedback principles as applied to discrete, hybrid, and integrated circuit amplifiers or regulators. Signal flow graph analysis will be used to determine accuracy and sensitivity of feedback loops. *Prereq.* 03.313.

03.382 Linear Active Circuit Design II (2 cl., 2 q.h.)

Factors influencing high and low frequency response, and slew rate of both discrete and integrated circuit amplifiers. Bode and gain-phase plots will be used to analyze stability of feedback loops. *Prereq.* 03.381.

03.383 Linear Active Circuit Design III (2 cl., 2 q.h.)

Active filter and oscillator design using both discrete and hybrid/integrated circuits. Principles of low-noise video amplifiers. Design of linear integrated electronic systems. *Prereq.* 03.382.

03.384 Microwave Semiconductor Devices and Circuits I (2 cl., 2 q.h.)

Provides basic understanding of the principles and design techniques for microwave circuits utilizing semiconductor devices. Introduction to microwave theory and techniques. Development of the Smith Chart for the graphical solution of microwave problems. *Prereq.* 03.304.

03.385 Microwave Semiconductor Devices and Circuits II (2 cl., 2 q.h.)

Introduction to the basic properties of semiconductors at microwave frequencies including analysis of bulk semiconductor effects and of junction phenomena. The course will analyze the physical properties and microwave characteristics of avalanche diodes, varactor diodes, tunnel diodes, PIN diodes, Gunn effect devices, and the microwave transistors. *Prereq.* 03.384.

03.386 Microwave Semiconductor Devices and Circuits III (2 cl., 2 q.h.)

Design and utilization of semiconductor devices in microwave circuits for microwave generation, amplification, frequency conversion, multiplication, and detection. Introduction to the miniaturization of microwave circuits and the integration of microwave functions. The characteristics and limitations of the devices. *Prereq.* 03.385.

03.387 Integrated Circuits I (2 cl., 2 q.h.)

Linear integrated circuits, operational amplifiers-characteristics, selection criteria, linear and nonlinear circuit applications, D/A and A/D converters. *Prereq.* 03.313.

03.388 Integrated Circuits II (2 cl., 2 q.h.)

Digital building blocks, truth tables and synthesis of digital logic. Flip-flops and timing circuits, logic families and specifications, arithmetic operations. *Prereq.* 03.387.

03.389 Integrated Circuits III (2 cl., 2 q.h.)

Arithmetic operations concluded, counters, registers and decoding, memories-magnetic, TTL and MOS, theory applied to calculators, digital phase lock loops. *Prereq.* 03.388.

03.391 Computer Technology Laboratory II (3 lab., 2 q.h.)

Logic performing circuits, flip-flops, binary-counters, sampling gates, pulse and counter circuits and frequency dividers, a study of an analog computer. *Prereq.* 03.327 or 09.356.

03.392 Computer Technology Laboratory III (3 lab., 2 q.h.)

A continuation of 03.391 topics plus the use of a PDP 8I minicomputer. *Prereq.* 03.391.

03.394 Electrical — Electronic Principles A (3 cl., 3 q.h.)

Laws of voltage, current, and power. Series and parallel circuits. Principles of magnetism, and electro-magnetic induction. Alternating current, voltage, and power relationships. Principles of capacitive and inductive reactance. Series parallel a-c circuits including resonance. Transformer, motor, and generator principles. Meters. *Prereq.* 10.503, 11.306.

03.395 Electrical — Electronic Principles B (3 cl., 3 q.h.)

Vacuum tubes, semiconductor diodes, and transistors. Principles of filters. Power supplies, amplifiers, oscillators, pulse circuits, motor and generator types and applications. *Prereq.* 03.307.

03.396 Basic Optics for Instrumentation (2 cl., 2 q.h.)

Provides the necessary background for the two instrumentation courses listed below. Includes basic topics in geometrical and physical optics. No previous background in optics is assumed. Topics included are: Gaussian optics; fundamental laws of image formation; basic elements of optical design; scalar wave theory; interference and diffraction; polarization; basics of coherent (laser) and non-coherent optics. *Prereq.* 10.308.

03.397 Optical Instrumentation I (2 cl., 2 q.h.)

Treats the classical image forming instruments (telescopes, microscopes, etc.) as components of optical systems. Includes magnification; aberrations; resolution criteria; photometry; compatibility of system components and optimization of systems. Topics in coherent imaging such as phase contrast and holography. *Prereq.* 03.396.

03.398 Optical Instrumentation II (2 cl., 2 q.h.)

The basic non-image forming systems used for analysis control and metrology. Includes: spectroscopy, interferometry (classical and holographic), electron-ion optical, and X-Ray systems. *Prereq.* 03.397.

03.399 Fundamentals of Operational Amplifiers (2 cl., 2 q.h.)

Emphasis on treating the amplifier as a black box. Covers gain, distortion, feedback, matching, offset, drift, and frequency response. A section on practical applications. *Prereq.* 03.312.

03.401 Electric Devices and Systems I (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153)

03.402 Electric Devices and Systems II (2 cl., 4 q.h.)

(See General Interest Courses, pages 152-153)

03.410 Electrical Measurements (4 cl., 4 q.h.) (Day Curriculum)

Measurement of voltage, current, power, resistance, capacitance, inductance, impedance, frequency, etc. Direct and substitution measurements. Evaluation of measured data — standard deviation and tolerance limits, instruments calibrations — effects of residual impedance. *Prereq.* 03.454.

03.420 Electricity and Electronics I (4 cl., 4 q.h.) (Day Curriculum)

Introduction to circuit analysis, resistive networks, periodic excitation function, steady state a-c circuits. The physical foundations of electronics and the physical operation of electronic devices. *Prereq.* 11.319.

03.421 Electricity and Electronics II (4 cl., 4 q.h.) (Day Curriculum)

Single-stage electronic circuits, magnetic circuits and transformers, electro-mechanical energy conversion, d-c machines, a-c machines. *Prereq.* 03.420.

03.440 Physical Electronics (4 cl., 4 q.h.) (Day Curriculum)

Electron Ballistics and applications. Properties of atoms and electrons as related to conduction of electricity in solids. Fundamentals of semiconductors, crystal diodes, and transistors. Theory of field-effect transistors, integrated circuits, and photoelectric devices. *Prereq.* 11.420.

03.430 Energy Conversion (4 cl., 4 q.h.) (Day Curriculum)

Generalized theory of rotating energy conversion devices. Steady-state operation of the multiply-excited direct-current machine. Control of speed; special machines. Transformers, steady-state considerations of induction and synchronous machines. Generalized machine and circuit model. Laplace transform techniques applied to the analysis of dynamic operating modes of rotating machines. *Prereq.* 03.452 and 10.422.

03.437 Distributed Systems (4 cl., 4 q.h.) (Day Curriculum)

Radiation, transmission, and reception of electromagnetic waves. Distributed-line constants and traveling waves of transmission lines. Differential equations of the uniform line. *Prereq.* 10.422.

03.451 Circuit Analysis I (4 cl., 4 q.h.) (Day Curriculum)

Ohm's law, Kirchoff's current and voltage laws, equivalent resistances and sources, mesh and modal analysis, network theorems, two-port networks and power relations — all with respect to direct currents. Energy storage, singularity functions, response of R, L, and C elements to singularities. *Prereq.* 10.320, 11.319.

03.452 Circuit Analysis II (4 cl., 4 q.h.) (Day Curriculum)

Complex algebra, phasors, frequency domain, mutual inductance, transformers, steady-state a-c theory, driving point and transfer impedances, power and energy in a-c circuits. Laplace transforms; partial fraction expansion; Laplace transform techniques applied to the solution of RLC networks. *Prereq.* 03.451.

03.453 Circuits Analysis III (4 cl., 4 q.h.) (Day Curriculum)

Application of differential equations to the solutions of linear, time-invariant electrical networks. Introduction to singularity functions, convolution, and time domain transient analysis. Network topology and duality, introduction to the methods of transformation calculus and complex frequency concepts. *Prereq.* 03.542.

03.454 Circuits Analysis IV (4 cl., 4 q.h.) (Day Curriculum)

Signal analysis in the frequency domain. Fourier series. Fourier and Laplace transform methods. A varied selection of circuit problems are solved using Laplace transforms and related theorems. *Prereq.* 03.453.

03.460 Engineering Analysis I (4 cl., 4 q.h.) (Day Curriculum)

Linear algebra and its application to circuit equations. Solution of linear differential equations including an introduction to Laplace transforms. *Prereq.* 10.422 and 03.452.

03.461 Engineering Analysis II (4 cl., 4 q.h.) (Day Curriculum)

Complex variables and their relevance to an electrical engineering program. *Prereq.* 10.422.

03.470 Digital Computers (4 cl., 4 q.h.) (Day Curriculum)

Introduction to the field of digital computer design. Topics include general computer organization, number systems and number representations, design characteristics of major computer units, Boolean Algebra applications to computer design. *Prereq.* 03.313 or concurrently.

03.477 Control Engineering I (4 cl., 4 q. h.) (Day Curriculum)

Analysis of linear servomechanisms under both transient and steady-state conditions. Signal flow graphs. Laplace transforms used in the formulation of block diagrams and transfer function. *Prereq.* 03.454 and 10.422.

03.478 Control Engineering II (4 cl., 4 q.h.) (Day Curriculum)

System stability. Root locus techniques. Treatment of Nyquist criteria, and Bode diagram methods for systems evaluation. *Prereq.* 03.477.

03.490 Optical Instrumentation (4 cl., 4 q.h.) (Day Curriculum)

Telescopes, microscopes, etc. as optical system components. Includes magnification; aberrations; resolution criteria; photometry. Compatibility of system components and optimization of systems. The basic non-image forming systems used for analysis control and metrology. *Prereq.* 10.308 and 11.319.

CHEMICAL ENGINEERING TECHNOLOGY

04.381 Nuclear Technology I (2 cl., 2 q.h.)

Atomic and nuclear structure, discovery and nature of radioactivity. Nuclear instrumentation for particle detection, monitoring, and experimentation. Supplementary laboratory experiments. *Prereq.* 10.323 and 11.319.

04.382 Nuclear Technology II (2 cl., 2 q.h.)

Nuclear reactions and energy; induced nuclear transformations; neutron properties. Radiological safety — the hazards, problems, and protection. Applications of radionuclides. Supplementary laboratory experiments. *Prereq.* 04.381.

04.383 Nuclear Technology III (2 cl., 2 q.h.)

The fission process and its applications; nuclear reactors — their classification, design and application; nuclear fuel processing; radioactive waste disposal. Supplementary laboratory experiments. *Prereq.* 04.382.

04.481 Nuclear Technology (4 cl., 4 q.h.)

Atomic and nuclear structure; discovery and nature of radioactivity. Nuclear reactions and energy; induced nuclear transformations, neutron properties. Nuclear instrumentation for particle detection, monitoring, and experimentation. The fission process and its applications; nuclear reactors — their classification, design, and application. Supplementary laboratory experiments. *Prereq.* 10.422 and 11.319.

ENGINEERING GRAPHICS AND COMPUTATION

09.307 Electrical and Electronic Graphics I (2 cl., 2 q.h.)

Instrument techniques; principles of projection, drawing, reading and interpretation of multiview drawings; isometric, oblique, pictorial representations, auxiliary views and sections. Two hours of laboratory classes. *Prereq.* none.

09.308 Electrical and Electronic Graphics II (2 cl., 2 q.h.)

Auxiliary views, sections, dimensioning; introduction to electronic graphics, including: symbols, schematics, block and logic diagrams, production and cable drawings, military standards. *Prereq.* 09.307.

09.309 Electrical and Electronic Graphics III (2 cl., 2 q.h.)

A study of single- and double-sided printed circuit layout, integrated circuits, electro-mechanical designs, wiring, and interconnection diagrams; graphical data presentation. *Prereq.* 09.308.

09.311 Engineering Graphics I (2 cl., 2 q.h.)

Introduction to engineering drawing, geometric construction, charts and graphs, orthographic projection through auxiliary views. *Prereq.* none.

09.312 Engineering Graphics II (2 cl., 2 q.h.)

Detail drawing, including intersections and development, reading of multiview drawings, pictorial representation. *Prereq.* 09.311.

09.313 Engineering Graphics III (2 cl., 2 q.h.)

Manufacturing processes and dimensioning. Topographical, earth work, drawing analysis of assemblies, case studies in engineering design. *Prereq.* 09.312.

09.314 Engineering Design I (Kinematics) (1 cl., 2 lab., 2 q.h.)

Translatory and rotary motion involving basic mechanisms through graphical vector and mathematical analysis of displacement, velocity, and acceleration. Some redesign of existing mechanisms. Simple, compound, reverted, and epicyclic gear trains. *Prereq.* 09.313, 11.317.

09.315 Engineering Design II (1 cl.; 2 lab., 2 q.h.)

Drawings and specifications for the production and precision machining of castings, forging, weldments, etc. Discussion of design components. *Prereq.* 09.314.

09.316 Engineering Design III (1 cl., 2 lab., 2 q.h.)

Introduction to design through graphical analysis of cam and follower motions, and other mechanisms. Creativity and design processes through case studies and original projects requiring oral presentation of student's involvement in both synthesis and innovative activities. *Prereq.* 09.315.

09.351 Principles of Computer Programming I (2 cl., 2 q.h.)*

Rules for forming simple FORTRAN programs. Students write and run programs to compute: Fibonacci sequences, averages, kinematic displacements, and maxima and minima in both discrete and continuous cases. Batch programming in FORTRAN IV. Introduction to computer organization and machine language. *Prereq.* 10.308.

09.352 Principles of Computer Programming II (2 cl., 2 q.h.)*

Extended capabilities of the FORTRAN language, including: DO loops, subscripted variables and alphanumeric arrays. Students write and run application programs for printer plotting, sorting, matrix algebra and approximations. Batch programming in FORTRAN IV. *Prereq.* 09.351.

09.353 Principles of Computer Programming III (2 cl., 2 q.h.)*

Subroutine and function subprograms. Use of Scientific Subroutine Package with programming applications in probability, solution of simultaneous linear equations, root finding and quadrature. Introduction to use of plotter. Batch programming in FORTRAN IV. *Prereq.* 09.352.

09.354 Computer Systems I (Software Systems) (2 cl., 2 q.h.)

Storage and retrieval techniques, machine language and symbolic coding, discussion of ALGOL, BASIC and PL/1. *Prereq.* 09.353.

09.355 Computer Systems II (Hardware Systems) (2 cl., 2 q.h.)

Card readers, printers, plotters, and other output devices. Tapes, discs, drums and methods for computer files. Data communication equipment, COBOL, processing quality control, computer installation management.

09.356 Computer Systems III (Operating Systems) (2 cl., 2 q.h.)

Batch processing, time sharing, mixed systems and multiprogramming, Northeastern University's operating system-MASTER.

09.357 Computer Aided Design I (Computer Graphics) (2 cl., 2 q.h.)

Computer graphics programming. Using the computer to draw two and three dimensional shapes. Character generation and manipulation methods. Implementation on Northeastern's calcomp plotter. *Prereq.* 09.353.

09.358 Computer Aided Design II (Problem Oriented Languages) (2 cl., 2 q.h.)

Discussion of popular languages, user oriented requirements, input algorithms, command structure, design of a POL system. *Prereq.* 09.353.

*Students at suburban campuses may find it necessary to periodically come to the Boston Campus Computation Center to run their homework problems.

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09.359 Computer Aided Design III (Simulation and Mathematical models) (2 cl., 2 q.h.)

Random numbers programs to predict the outcome of probabilistic systems. Computer models of deterministic systems. *Prereq.* 09.353.

09.361 Computer Controlled Systems I (2 cl., 2 q.h.)

Introduction to minicomputers. Minicomputers organization and logical components. Basic machine language programming. *Prereq.* 09.353.

09.362 Computer Controlled Systems II (2 cl., 2 q.h.)

Extended programming of minicomputers. The use of a minicomputer as an element in process control. Analysis of open and closed loop systems. *Prereq.* 09.361.

09.363 Computer Controlled Systems III (2 cl., 2 q.h.)

Specification of computer elements for a control system. Design and synthesis of a computer controlled system to meet process requirements. *Prereq.* 09.362.

09.401. Interpretation of Industrial Drawings (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153).

09.421 Principles of Computer Programming I (2 cl., 2 q.h.) (Day Curriculum)

Rules for forming simple FORTRAN programs. Basic input/output techniques. FORMAT control. Algorithms for solving simple scientific problems. Computing large sums; maxima and minima in both discrete and continuous cases. *Prereq.* 10.308 or concurrently.

09.422 Principles of Computer Programming II (2 cl., 2 q.h.)

(Day Curriculum)

Extended capabilities of the FORTRAN language. Manipulation of vectors and arrays. Subroutine and function subprogramming. Continued applications of computers, sorting, merging, root determination. A-Format. *Prereq.* 09.421.

09.423 Principles of Computer Programming III (2 cl., 2 q.h.)

(Day Curriculum)

Use of scientific subroutines, simulation, random numbers. Introduction to numerical methods (solution of simultaneous equations, quadrature, derivatives). Use of plotter language. Display of information. *Prereq.* 09.422.

09.461 Engineering Design Graphics I (2 cl., 2 q.h.)

(Day Curriculum)

Introduction to engineering drawing. Orthographic projection and primary auxiliary views. Reading and interpreting of multiview drawings. Isometric and oblique pictorial representation. *Prereq.* none.

09.462 Engineering Design Graphics II (2 cl., 2 q.h.)

(Day Curriculum)

Emphasis on engineering drawings required to support engineering design, including standard conventions, dimensioning, and basic production processes. Shop detail drawings are covered. Exercise in design processes are given through selected projects and case studies. *Prereq.* 09.461.

09.463 Engineering Design Graphics III (2 cl., 2 q.h.)

(Day Curriculum)

Greater involvement in design by examination of many commonly used components. Case studies of large systems discussed in class. Advanced design projects assigned. *Prereq.* 09.462.

09.464 Engineering Design Graphics IV (4 cl., 4 q.h.) (Day Curriculum)
Graphical analysis of kinematic elements. Displacement, locus generators, velocity vectors, and sliding motion. Simple, compound, and reverted gear trains. Acceleration analysis of mechanisms such as cams and linkages. Functions and scales and nomographs. Introduction to self-correcting (feed-back) systems. *Prereq.* 09.463.

MATHEMATICS

10.301 Introduction to Mathematics I (4 cl., non-credit)

A comprehensive review of high school algebra including: first-degree equations, factoring, fractions, fractional equations, ratio and proportion, word problems, and concepts of plane geometry. *Prereq.* none.

10.302 Introduction to Mathematics II (4 cl., non-credit)

Algebraic operations with complex fractions, mixed expressions, square roots, radicals, quadratic equations; simultaneous equations, graphs and fractional zero and negative exponents. The geometry of the right triangle, areas of polygons, circles, and loci problems. Basic slide rule operation. *Prereq.* 10.301.

10.303 Introduction to Mathematics

An accelerated combination of 10.301 and 10.302. Primarily for day students.

10.307 College Algebra and Trigonometry I (4 cl., 4 q.h.)

Fundamental algebraic operations; radicals and exponents; functions; quadratic equations and applications; irrational equations; systems of equations; variation; binomial expansion. Trigonometric functions of angles in degrees; right triangles. *Prereq.* Math. Placement Test or 10.302.

10.308 College Algebra and Trigonometry II (4 cl., 4 q.h.)

Logarithms; applications of right triangles; radian measure; trigonometric identities and equations; oblique triangles. Inequalities; complex numbers; roots of polynomial equations. *Prereq.* 10.307.

10.316 Probability and Statistics I (2 cl., 2 q.h.)

Basic tools, e.g., sets, permutations and combinations; probability and applications. *Prereq.* 10.308, or 10.329 or 10.335.

10.317 Probability and Statistics II (2 cl., 2 q.h.)

Descriptive statistics; frequency distributions and probability density functions; normal and other distributions. *Prereq.* 10.316.

10.318 Probability and Statistics III (2 cl., 2 q.h.)

Bivariate distributions; correlation; statistical inference and estimation; regression. *Prereq.* 10.317.

10.320 Calculus I (4 cl., 4 q.h.)

Plane Analytic Geometry. Differentiation of algebraic functions. Rate, motion, maximum and minimum problems. Derivatives of higher order. Curve sketching. Basics in functions, limits and continuity. *Prereq.* 10.308 or 10.329.

10.321 Calculus II (2 cl., 2 q.h.)

Integration of algebraic functions. Integration and differentiation of logarithmic, exponential and trigonometric terms. Calculations of areas, volumes and length of arc by definite integrals. *Prereq.* 10.320.

10.322 Calculus III (2 cl., 2 q.h.)

Differentiation and integration of inverse trigonometric functions. Integration by parts, substitution, and tables. The Trapezoidal and Simpson Rules. The application of the differential and integral calculus to the Polar Coordinate System. Vectors in the plane. Indeterminate forms. *Prereq.* 10.321.

10.323 Calculus IV (2 cl., 2 q.h.)

Vectors in three-dimensional space. Functions of more than one variable. Partial differentiation. Multiple integration. Infinite series. Taylor's and Maclaurin's Formula. *Prereq.* 10.322.

10.324 Differential Equations I (2 cl., 2 q.h.)

Vector analysis; matrices and linear algebra. *Prereq.* 10.323.

10.325 Differential Equations II (2 cl., 2 q.h.)

Ordinary differential equations — standard types of the first order; linear differential equations, especially with constant coefficients. Variation of parameters. *Prereq.* 10.324.

10.326 Differential Equations III (2 cl., 2 q.h.)

Series solutions of differential equations; Laplace transforms, Fourier series, and orthogonal functions. *Prereq.* 10.325.

10.327 Mathematics I (2 cl., 2 q.h.)

Methods and applications of algebra; graphical techniques. *Prereq.* *Math. Placement Test*, 10.331 or 10.302.

10.328 Mathematics II (2 cl., 2 q.h.)

Linear and quadratic equations; exponents and radicals; variation. *Prereq.* 10.327.

10.329 Mathematics III (2 cl., 2 q.h.)

Review of geometry; topics of trigonometry; introduction to statistics and probability; logarithms. *Prereq.* 10.328.

10.330 Basic Mathematics I (2 cl., non-credit)

A review of elementary algebra; algebraic expressions and operations, equations, word problems. *Prereq.* none.

10.331 Basic Mathematics II (2 cl., non-credit)

Further review; operations with polynomials, factoring, fractional expressions, word problems. *Prereq.* 10.330.

10.332 Mathematics for Business Management I (2 cl., 2 q.h.)

Introduction to mathematics underlying operations research, with emphasis on applications to business management logic, set theory. *Prereq.* 10.329 or *equiv.*

10.333 Mathematics for Business Management II (2 cl., 2 q.h.)

Probability and its uses in decision-making under uncertainty; introduction to vector and matrix algebra. *Prereq.* 10.332 or *equiv.*

10.334 Mathematics for Business Management III (2 cl., 2 q.h.)

Mathematics of finance, linear programming and optimization techniques, game theory. *Prereq.* 10.333 or *equiv.*

10.351 Advanced Mathematics I (Numerical Analysis) (2 cl., 2 q.h.)

Basic methods of numerical analysis — roots by iteration; approximating polynomials and interpolation; least squares fitting; numerical integration; approximate solution of ordinary differential equations — problems employing the electronic computer. *Prereq.* 09.353 and 10.326.

10.352 Advanced Mathematics II (2 cl., 2 q.h.)

Introduction to partial differential equations, boundary-value problems, Sturm-Liouville systems. *Prereq.* 10.351.

10.353 Advanced Mathematics III (2 cl., 2 q.h.)

Special topics in analysis. *Prereq.* 10.352.

10.361 Modern Algebra I (2 cl., 2 q.h.)

Sets; binary operations; mappings; rings, integers, fields; rationals; reals, bases for computer applications; Euclidean algorithm; primes. *Prereq.* 10.308, 10.329 or 10.335.

10.362 Modern Algebra II (2 cl., 2 q.h.)

Field of complex number; groups; subgroups; polynomial rings; homomorphisms; isomorphisms; ideals. *Prereq.* 10.361.

10.363 Modern Algebra III (2 cl., 2 q.h.)

Vector spaces; linear transformations; dependence, independence; dimension applications to engineering, science, and business. *Prereq.* 10.362.

10.364 Modern Applied Algebra (4 cl., 4 q.h.)

Introduce the language of abstract algebra to the following topics: graphs, finite state machines, programming languages, Boolean Algebra, lattices, coding for communication channels and radar. Look at algebraic theory of linear systems, *Prereq.* 10.361, 10.362 and 10.363.

10.391 Mathematics — A (3 cl., 3 q.h.)

Methods and applications of algebra; graphical techniques. Linear and quadratic; exponents and radicals. (No credit to students who have passed 10.327, or 10.328, or 10.335). *Prereq.* Math. Placement Test, 10.302, or 10.331.

10.392 Mathematics — B (3 cl., 3 q.h.)

Variation; review of geometry; topics of trigonometry; introduction to statistics and probability; logarithms. (No credit to students who have passed 10.329.) *Prereq.* 10.391.

10.401 Foundations of Mathematics I (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153.)

10.402 Foundations of Mathematics II (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153.)

10.403 Foundations of Mathematics III (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153.)

10.421 Calculus — A (4 cl., 4 q.h.)

(Day Curriculum)

Applications of derivatives to curve-sketching; antidifferentiation; the definite integral, with applications; calculus of non-algebraic functions — logarithmic, exponential, and trigonometric. Calculus of inverse trigonometric functions; techniques of integration; polar coordinates; the conic sections; vectors in a plane; indeterminate forms, L'Hospital's rule. *Prereq.* 10.320.

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10.422 Calculus — B (3 cl., 4 q.h.) (Day Curriculum)
Calculus of functions of several variables, partial differentiation, multiple integrals, infinite series. Vector analysis; matrices and linear algebra. *Prereq.* 10.421.

10.423 Differential Equations (4 cl., 4 q.h.) (Day Curriculum)
Ordinary differential equations — standard types of the first order; linear differential equations, especially with constant coefficients; Laplace transforms, series solutions of differential equations. Fourier series and orthogonal functions. *Prereq.* 10.422.

PHYSICS

*Courses marked * not available in every curriculum. See curricula in Programs of Instruction section, for applicable sequence, pp. 57-98.*

11.301 Introductory Physics I (4 cl., non-credit)
A survey of physical principles and theories related to field of mechanics. Emphasis is placed upon the solution of applied problems. *Prereq.* none.

11.302 Introductory Physics II (4 cl., non-credit)
Extension of principles in mechanics and introduction of concepts in heat, sound, light, electricity, and magnetism. *Prereq.* 11.301.

***11.304 General Physics I** (2 cl., 2 q.h.)
Survey of Newtonian mechanics; kinematics and dynamics of particle motion; projectile and circular motion; rotational motion, conservation laws of energy and momentum. *Prereq.* 10.327 or concurrently.

***11.305 General Physics II** (2 cl., 2 q.h.)
Temperature; heat energy; mechanical equivalent of heat; wave motion; sound; Doppler's effect; properties of light; simple optical systems. *Prereq.* 11.304.

***11.306 General Physics III** (2 cl., 2 q.h.)
Fundamentals of electricity and magnetism; fields; potential; electric current; inductance; capacitance; electromagnetism; a-c and d-c series circuits. *Prereq.* 11.305.

11.317 Physics I (Mechanics) (4 cl., 4 q.h.)
Kinematics and dynamics of particle motion; Newton's laws; projectile and circular motion; conservation laws for momentum and energy; rotational motion; simple harmonic motion. *Prereq.* 10.307 or concurrently.

11.318 Physics II (Wave Motion, Sound, Heat) (4 cl., 4 q.h.)
Wave motion; intensity; interference phenomena; Doppler effect; vibrating systems; temperature; heat; change of state; heat transfer; kinetic theory of gases; general gas laws; thermodynamics. *Prereq.* 11.317.

11.319 Physics III (Electricity, Magnetism, Light) (4 cl., 4 q.h.)
Electrostatics; magnetism; magnetic induction; induced currents; direct and alternating current circuits; properties of light; reflection; refraction; dispersion; optical systems; diffraction; polarization. *Prereq.* 11.318.

11.320 Semiconductor Physics & Devices (4 cl., 4 q.h.)

Electron Ballistics and applications. Properties of atoms and electrons as related to conduction of electricity in solids. Fundamentals of semiconductors, crystal diodes, and transistors. Theory of field-effect transistors, integrated circuits, and photoelectric devices. (This is a combination of 11.322 and 11.323.) *Prereq.* 11.316, or 11.319.

11.321 Wave Phenomena (2 cl., 2 q.h.)

Application of fundamental principles of waves to electromagnetic radiation. Waves on transmission lines. Selected topics in antennas and wave guides. *Prereq.* 11.319 or 11.316.

11.322 Semiconductor Physics I (2 cl., 2 q.h.)

Electron Ballistics and applications. Properties of atoms and electrons as related to conduction of electricity in solids. *Prereq.* 11.319.

11.323 Semiconductor Devices II (2 cl., 2 q.h.)

Fundamentals of semiconductors, crystal diodes, and transistors. Theory of field-effect transistors, integrated circuits and photoelectric devices. *Prereq.* 11.322.

11.324 Introductory Survey of Lasers (2 cl., 2 q.h.)

Physical principles and technology will be emphasized. Course will include a review of the fundamental concepts of light and spectroscopy, the basic theory of lasers, studies of solid state; atomic, ionic and molecular gas; organic dye; and semiconductor lasers. Related optics and detection will be discussed. *Prereq.* 11.319.

11.331 Modern Physics I (2 cl., 2 q.h.)

Introduction to theory of relativity; particle properties of waves; wave properties of particles; atomic structure; Bohr model of the atom. *Prereq.* 11.306 or 11.319.

11.332 Modern Physics II (2 cl., 2 q.h.)

Quantum mechanics; electron spin; atomic spectra; complex atoms; solid state physics; lasers. *Prereq.* 11.331.

11.333 Modern Physics III (2 cl., 2 q.h.)

Atomic nucleus; radioactive decay; thermonuclear energy; nuclear reactions; elementary particles. *Prereq.* 11.332.

11.341 Physics Laboratory I (3 lab., 2 q.h.)

Experiments in dynamics, two-body kinematics and scattering, geometrical optics and thermodynamics. *Prereq.* 11.319.

11.342 Physics Laboratory II (3 lab., 2 q.h.)

Experiments in physical optics, spectroscopy and quantum physics. *Prereq.* 11.341.

11.343 Physics Laboratory III (3 lab., 2 q.h.)

Experiments in electricity and magnetism, simple electric and electronic circuits. *Prereq.* 11.342.

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11.373 Physics Laboratory I (3 cl., 2 q.h.)

First quarter of a two quarter physics laboratory. *Prereq.* 11.305 or 11.318, or concurrently.

11.374 Physics Laboratory II (3 cl., 2 q.h.)

A continuation of 11.373.

11.401 Man's Physical Environment I (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153.)

11.402 Man's Physical Environment II (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153.)

11.420 Physics IV (4 cl., 4 q.h.)

(Day Curriculum)

Application of fundamental principles of waves to electromagnetic radiation. Waves on transmission lines. Further study of wave motion topics from 11.318. *Prereq.* 11.319.

CHEMISTRY

Students wishing to elect other chemistry courses should refer to the University College Catalog and petition for approval by the Academic Standing Committee of Lincoln College.

12.501 Introductory Chemistry I (4 cl., non-credit)

A non-mathematical approach to the concepts of chemistry including matter, elements and compounds, chemical bonding, chemical equations. *Prereq.* None.

12.502 Introductory Chemistry II (4 cl., non-credit)

A continuation of 12.501, including periodic system, forms of energy, oxidation-reduction, solutions, chemical and ionic equilibrium, nuclear reactions, and a brief introduction to organic chemistry. *Prereq.* 12.501 or equiv.

12.507 Modern Chemistry I (Intro. to Inorganic Chemistry) (2 cl., 2 q.h.)

Fundamental ideas of matter and energy, chemical bonding, chemical energy, water and solutions, colloids, ionic reactions, oxidation and reduction, acidity, radio activity, all discussed from the viewpoint of recent developments. *Prereq.* 10.327 or concurrently.

12.508 Modern Chemistry II (Intro. to Organic Chemistry) (2 cl. 2 q.h.)

Classes of organic compounds, including hydrocarbons, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines and amides, carbohydrates, including the relationship with modern biology. *Prereq.* 12.507 or equiv.

12.509 Modern Chemistry III (Intro. to the Chemistry of Living Bodies)

(2 cl., 2 q.h.)

Includes fats, proteins, enzymes, chemistry of digestion and the chemical reactions characteristic of body fluids. *Prereq.* 12.508 or equiv.

12.515 Biochemistry I (2 cl., 2 q.h.)

The first quarter of a three-quarter course sequence. The sequence will cover introduction to the biochemistry of the cell, including the occurrence, chemistry, and metabolism of carbohydrates, lipids, proteins, and nucleic acids. *Prereq.* 12.533 or equiv.

12.516 Biochemistry II (2 cl., 2 q.h.)

Continuation of Biochemistry I. *Prereq.* 12.515.

12.517 Biochemistry III (2 cl., 2 q.h.)

Continuation of Biochemistry II. *Prereq.* 12.516.

12.521 Analytical Chemistry I (2 cl., 2 q.h.)

Analytical procedures and techniques. The principles of solution chemistry, ionic equilibria, and oxidation potentials applied to solving problems in chemical analysis. *Prereq.* 12.546 and 12.549 or *equiv.*

12.522 Analytical Chemistry II (2 cl., 2 q.h.)

Principles and practice of gravimetric and titrimetric methods of analysis. *Prereq.* 12.521.

12.523 Analytical Chemistry III (2 cl., 2 q.h.)

Theory of spectrophotometry, chromatography, and selected electro-analytical methods. *Prereq.* 12.522.

12.524 Analytical Chemistry Laboratory I (3 lab., 2 q.h.)

Qualitative analysis. Separations by chemical means, chemical tests, and spot tests for inorganic ions in solution. *Prereq.* 12.521 or *concurrently or equiv.*

(Laboratory Fee)

12.525 Analytical Chemistry Laboratory II (3 lab., 2 q.h.)

Chemical methods of quantitative analysis. Procedures and techniques of gravimetric and volumetric methods of chemical analysis. *Prereq.* 12.522 or *concurrently or equiv.*

(Laboratory Fee)

12.526 Analytical Chemistry Laboratory III (3 lab., 2 q.h.)

Instrumental methods of analysis. Instruments and procedures for electro-metric and optical methods of chemical analysis. *Prereq.* 12.525 and 12.523 or *concurrently or equiv.*

(Laboratory Fee)

12.531 Organic Chemistry I (2 cl., 2 q.h.)

Nature of carbon in organic compounds. General principles of structure, nomenclature, preparation, uses, and reactions, of aliphatic hydrocarbons: alkanes, alkenes, alkynes, dienes, cycloalkanes. Position and geometric isomerism. Introduction to free radical and ionic mechanisms of reactions. *Prereq.* 12.546 and 12.549 or *equiv.*

12.532 Organic Chemistry II (2 cl., 2 q.h.)

Structure of benzene, electrophilic aromatic substitution reactions. General principles of structure, nomenclature, preparation, uses and reactions of the various types of organic compounds, including: alcohols, alkyl and aryl halides, ethers and epoxides, and carboxylic acids. Optical isomerism and introductory chemical kinetics will be discussed. *Prereq.* 12.531 or *equiv.*

12.533 Organic Chemistry III (2 cl., 2 q.h.)

Continuation of Chemistry 12.532 with emphasis on the application of chemical interconversions to synthetic problems. Functional derivatives of carboxylic acids, sulfonic acids and their derivatives, amines, diazonium compounds, phenols, aldehydes and ketones. *Prereq.* 12.532 or *equiv.*

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12.534 Organic Chemistry Laboratory I (3 lab., 2 q.h.)

Co-ordinated with the lecture course, Organic Chemistry I, and deals with the preparation and properties of compounds discussed. *Prereq. 12.546 or equivalent and 12.531 or concurrently.*

12.535 Organic Chemistry Laboratory II (3 lab., 2 q.h.)

Co-ordinated with the lecture course, Organic Chemistry II, and deals with the preparation and properties of compounds discussed. *Prereq. 12.534. or equiv.*
(Laboratory Fee)

12.536 Organic Chemistry Laboratory III (3 lab., 2 q.h.)

Co-ordinated with the lecture course, Organic Chemistry III, and deals with the preparation and properties of compounds discussed. *Prereq. 12.535 or equiv.*
(Laboratory Fee)

12.541 Physical Chemistry I (2 cl., 2 q.h.)

The three states of matter, atomic and molecular forces, physical properties and molecular structure; heat, work and heat capacity; thermochemistry. *Prereq. 12.513, 12.516, 10.323 or 11.306.*

12.542 Physical Chemistry II (2 cl., 2 q.h.)

Thermodynamics, solutions, chemical equilibria, phase diagrams, and chemical kinetics. *Prereq. 12.541 or equiv.*

12.543 Physical Chemistry III (2 cl., 2 q.h.)

Electrical conductance, electromotive force, ionic equilibria, colloids, quantum theory, and photochemistry. *Prereq. 12.542 or equiv.*

12.544 General Chemistry I (2 cl., 2 q.h.)

Fundamental concepts; symbols, formulas, and equations; atomic structure and Periodic Law, chemical bonding; oxygen, ozone, and hydrogen; the gaseous state and gram mole volume; the liquid and solid states; water and hydrogen peroxide. *Prereq. 10.307 or 10.327 or concurrently or equiv. (Not open to those students with credit for 12.311 or 12.314.)*

12.545 General Chemistry II (2 cl., 2 q.h.)

Solutions, solutions of electrolytes, colloids, oxidation and reduction reactions, periodic properties, halogens, chemical equilibrium, electrochemistry; acids, bases, and salts; sulfur family. *Prereq. 12.544 or equiv. (Not open to those students with credit for 12.512 or 12.515.)*

12.546 General Chemistry III (2 cl., 2 q.h.)

Ionic equilibrium and weak electrolytes; solubility product principle, hydrolysis. Nitrogen, phosphorous, and their compounds; boron, silicon, and their compounds; alkali and alkaline earth metals, metals of groups III and IV. Nuclear chemistry. Carbon and its compounds. Biochemistry. *Prereq. 12.545 or equiv. (Not open to those students with credit for 12.513 or 12.516.)*

12.547 General Chemistry Laboratory I (2 lab., 1 q.h.)

Co-ordinated with the lecture course, General Chemistry I, and deals with the preparation and properties of elements and compounds discussed. *Prereq. 12.544 or concurrently or equiv. (Not open to those students with credit for 12.514.)*
(Laboratory Fee)

12.548 General Chemistry Laboratory II (2 lab., 1 q.h.)

Co-ordinated with the lecture course, General Chemistry II, and deals with the preparation and properties of elements and compounds discussed. *Prereq.* 12.547 or equiv. (Not open to those students with credit for 12.315.)

(Laboratory Fee)

12.549 General Chemistry Laboratory III (2 lab., 1 q.h.)

Qualitative analysis experiments, including unknown solutions. *Prereq.* 12.548 or equiv. (Not open to those students with credit for 12.316) (Laboratory Fee)

12.551 Instrumental and Radiochemistry I (2 cl., 2 q.h.)

Definitions, physical principles, scope and application; principles of measurement; endpoint-detection systems for volumetric analysis, data treatment and interpretation. Optical methods of analysis including spectrophotometry, excitation methods, measurements of other optical properties, and mass spectrometry. *Prereq.* 12.523 or equiv.

12.552 Instrumental and Radiochemistry II (2 cl., 2 q.h.)

Methods of separation, vapor phase chromatography, ion exchangers; electrical methods of analysis including potentiometry, voltammetry, coulometry, and conductimetry; miscellaneous instrumental measurements. *Prereq.* 12.551 or equiv.

12.553 Instrumental and Radiochemistry III (2 cl., 2 q.h.)

Radioactivity and nuclear reactions, production and study of nuclear reactions, equations of radioactive decay, nuclear states and radioactive processes, interaction of radiations with matter, radiation detection and measurement, statistics of radioactivity measurements, techniques for the study of radionuclides, tracers in chemical applications and nuclear energy. *Prereq.* 12.552 or equiv.

12.554 Physical Chemistry Laboratory I (3 cl., 2 q.h.)

Experimental studies of viscosity, thermochemistry, and homogeneous equilibrium. *Prereq.* 12.542. (Laboratory Fee)

12.555 Physical Chemistry Laboratory II (3 cl., 2 q.h.)

Experimental studies of phase equilibrium, solution thermodynamics and chemical kinetics. *Prereq.* 12.554. (Laboratory Fee)

EARTH SCIENCE

Students wishing to elect other earth science courses should refer to the University College Catalog and petition for approval by the Academic Standing Committee of Lincoln College.

16.531 Oceanography I (2 cl., 2 q.h.)

An introduction to the geology of the ocean basins and the physical and chemical properties of sea water. The development of ocean currents and their effect on the land masses of the world. *Prereq.* Earth Sci. I or equiv.

16.532 Oceanography II (2 cl., 2 q.h.)

The habitat zones and organisms of the sea. Phytoplankton, zooplankton, and nekton are discussed. The growing economic importance of marine resources for the expanding world population. *Prereq.* 16.531 or equiv.

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16.533 Marine Geology (2 cl., 2 q.h.)

Physiography and structure of ocean basins. Marine geological processes and features, including sedimentation, erosion, shorelines, and bottom topography. Methods and techniques of marine geological exploration. *Prereq. Earth Sci. I or equiv.*

BIOLOGY

Students wishing to elect other biology courses should refer to the University College Catalog and petition for approval by the Academic Standing Committee of Lincoln College.

18.507 Gross Anatomy and General Physiology I (2 cl., 2 q.h.)

Fundamental concepts of living organisms, chemical and biological characteristics of cellular metabolism. The skeletal system and its appendages. General nomenclature, anatomical names and terms. *Prereq. none.*

18.508 Gross Anatomy and General Physiology II (2 cl., 2 q.h.)

The systems of the body and the relationships between them. The structure and function of each. *Prereq. 18.507 or equiv.*

18.509 Gross Anatomy and General Physiology III (2 cl., 2 q.h.)

Continuation of the systems of the body and the relationship between them. *Prereq. 18.508 or equiv.*

18.511 Biology I (General) (3 cl., lab., 4 q.h.)

Universal properties and processes of living organisms. Cellular composition and cellular activities; inheritance and cellular control; the evolutionary process; environmental relationships. *Prereq. none.* (Laboratory Fee)

18.512 Biology II (Animal) (3 cl., 3 lab., 4 q.h.)

Systematic comparative study of the structure and functions of animals. Diversity of animals considered from the standpoint of evolutionary adaptation. *Prereq. 18.511 or equiv.* (Laboratory Fee)

18.513 Biology III (3 cl., 3 lab., 4 q.h.)

A continuation of the study of animal biology. *Prereq. 18.512* (Laboratory Fee)

18.521 Microbiology I (2 cl., 4 lab., 4 q.h.)

Morphology and biochemistry of the bacteria. *Prereq. 18.513 or equiv.* (Laboratory Fee)

18.522 Microbiology II (2 cl., 4 lab., 4 q.h.)

Biology of the protists; the role of microorganisms in the environment. *Prereq. 18.521 or equiv.* (Laboratory Fee)

18.523 Microbiology III (2 cl., 4 lab., 4 q.h.)

Survey of pathogenic microorganism. (Laboratory Fee)

18.524 Human Anatomy and Physiology I (2 cl., 2 lab., 3 q.h.)

Introduction to human anatomy, osteology, anatomy of the muscular system, respiratory system, digestive system, the vascular system, urogenital system. The laboratory includes a study of human bones and cat dissection. *Prereq. 18.306 or 18.513 or equiv.*

18.525 Human Anatomy and Physiology II (2 cl., 2 lab., 3 q.h.)

Principles of physiology and continuation of the study of human anatomy. The laboratory is mainly concerned with muscle physiology. *Prereq.* 18.524 or *equiv.* (Laboratory Fee)

18.526 Human Anatomy and Physiology III (2 cl., 2 lab., 3 q.h.)

Continuation of the principles of physiology. The anatomy and physiology of the nervous system, physiology of the endocrine system. The laboratory deals with physiology of respiration and the physiology of blood. *Prereq.* 18.525 or *equiv.* (Laboratory Fee)

18.560 Environmental Ecology (4 cl., 4 q.h.)

Biotic and abiotic aspects of the environment. Geo-physico-chemocycles in the biosphere. Food chain and the ecosystem. Energy cycling. Environmental pollution. Population explosion and natural resources. Future of man as a species. Role of government, industry, and individuals in controlling the environment. *Prereq.* none.

18.561 Ecology I (2 cl., 2 q.h.)

Environmental factors. The soil system. Water. The atmosphere. Temperature, light, wind, pressure. The physico-chemical factors — CO₂, N and mineral nutrients. Habitat. Distribution of plants and animals in the world according to temperature and precipitation. *Prereq.* 18.513 or *equiv.*

18.562 Ecology II (2 cl., 2 q.h.)

The ecosystem. Ecological niche. The producers, consumers, and decomposers. The pond ecosystem, desert ecosystem, forest ecosystem, and sea shore ecosystem. Energy cycle and efficiency of energy utilization. Mass, weight, and energy pyramids. *Prereq.* 18.561 or *equiv.*

18.563 Ecology III (2 cl., 2 q.h.)

Population ecology. Biotic community. Population growth. Relations between the species. Symbiosis. Competition. Predation. Succession. *Prereq.* 18.562 or *equiv.*

18.564 Man and his Biosphere I (2 cl., 2 q.h.)

An ecological analysis of the human situation and man's interaction with other organisms. The necessary foundation of biological principles will be presented.

18.565 Man and His Biosphere II (2 cl., 2 q.h.)

A continuation of Man and Environment I. The problems discussed are individual and separable from the subject matter of Part I and may be elected without having had 18.564.

LIBERAL ARTS

Students wishing to elect other humanities, social science, and natural science courses should refer to the University College Catalog and petition for approval by the Academic Standing Committee of Lincoln College.

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19.501 Psychology I (2 cl., 2 q.h.)

An introductory survey of the historical backgrounds of psychology, psychological measurement and testing, and principles of animal and human learning. *Prereq. none.*

19.502 Psychology II (2 cl., 2 q.h.)

Principles of sensory processing, perception, motivation and emotion, and social influences on behavior. *Prereq. 19.501 or equivalent.*

19.503 Psychology III (2 cl., 2 q.h.)

Personality theory and measurement, behavior disorders, mental health, and psychotherapy. *Prereq. 19.502 or equivalent.*

19.507 Psychology (Intensive) (6 cl., 6 q.h.)

An introductory survey of the historical backgrounds of psychology, psychological measurement and testing, and principles of animal and human learning. Principles of sensory processing, perception, motivation and emotion, and social influences on behavior. Personality theory and measurement, behavior disorders, mental health, and psychotherapy. (Not open to students who have taken 19.501, 19.502, 19.503.) *Prereq. none.*

19.508 Fundamentals of Psychology I (4 q.h.)

Basic concepts from most areas of psychological investigation; the experimental orientation to the study of behavior, including child development, individual differences, learning, and social psychology. (Recommended for psychology majors.) (Not open to students who have credit for 19.501, 502, 503.)

19.509 Fundamentals of Psychology II (4 q.h.)

The sensory basis of behavior, cognition, perception, motivation, emotions, normal and abnormal personality. (Recommended for psychology majors.) *Prereq. 19.508 or equiv. (Not open to students who have credit for 19.501, 502, 503.)*

21.501 Sociology I (2 cl., 2 q.h.)

Basic concepts and theories relating to the study of man as a participant in group life with emphasis on social structure, culture, socialization, and the family.

21.502 Sociology II (2 cl., 2 q.h.)

A continuation of Sociology I with major emphasis on primary groups, associations, social stratification, collective behavior, and population. *Prereq. 21.501 or equivalent.*

21.503 Sociology III (2 cl., 2 q.h.)

A continuation of Sociology II focusing on the major institutional areas, with particular attention to problems of social, political, urban, and industrial change. *Prereq. 21.502 or equivalent.*

21.504 Sociology (Intensive) (6 cl., 6 q.h.)

Basic concepts and theories relating to the study of man as a participant in group life with emphasis on social structure, culture, socialization, and the family. Primary groups, associations, social stratification, collective behavior, and population. The major institutional areas, with particular attention to problems of social, political, urban, and industrial change. (Not open to students who have taken 21.501, 21.502, 21.503.)

21.601 Principles of Sociology I (4 q.h.)

An intensive introduction to basic concepts and theories relating to the study of man as a participant in group life. Emphasis is placed on socialization, culture, social structure, primary groups, family, social stratification, and population.

21.602 Principles of Sociology II (4 q.h.)

A continuation of Principles of Sociology I with emphasis on a critical analysis of American society with particular attention to problems of social, political, urban, and industrial change. *Prereq.* 21.601 or *equiv.*

23.501 Western Civilization I (2 q.h.)

The beginnings of Western Civilization with emphasis on the political, economic, and social history of ancient and medieval times to 1300.

23.502 Western Civilization II (2 q.h.)

Early Modern Europe from 1300 to 1789 with an examination of the two major intellectual movements, the Renaissance and the Enlightenment, and their impact on the rise of national states, capitalism, and Protestantism.

23.503 Western Civilization III (2 q.h.)

Modern Europe from 1789 to the present emphasizing the rise of ideology in a technological age.

23.507 Western Civilization (Intensive) (6 cl., 6 q.h.)

The beginnings of Western civilization with emphasis on the political, economic, and social history of the ancient and medieval world. Modern Europe to 1815 with an examination of the two major intellectual movements — the Renaissance and the Enlightenment — and their impact upon religious movements, economic developments, and the rise of national states. Western civilization since 1815, emphasizing the Scientific and Industrial Revolutions and their impact upon democracy and authoritarianism, nationalism and internationalism, and war and peace. (Not open to students who have taken 23.501, 23.502, 23.503.) *Prereq.* none.

23.509 Western Civilization A (3 q.h.)

Western Civilization to 1648.

23.510 Western Civilization B (3 q.h.)

Western Civilization since 1648.

27.541 Drawing I (3 q.h.)

Practice in the techniques and development of drawing in pencil and pen and ink, with concentration on basic drawing problems.

27.542 Drawing II (3 q.h.)

Practice in the techniques of wash drawing, scratch board drawing, and mixed medias. *Prereq.* 27.541 or *equiv.*

27.543 Drawing III (3 q.h.)

Study of human anatomy and the practice of figure drawing and composition. *Prereq.* 27.542 or *equiv.*

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93.401 Technical Communications (4 cl., 4 q.h.)

Thought organization and effective sentences. Written reports and instruction manuals. Specifications and proposals. Graphics aids and reproduction processes. *Prereq. none.*

30.501 English for International Students I (2 cl., non-credit)

Introduction to English grammar for foreign-speaking students with an emphasis on listening, speaking, and writing; selected readings and exercises to strengthen vocabulary and pronunciation. *Prereq. none.*

30.502 English for International Students II (2 cl., non-credit)

A continuation for 30.501 emphasizing the preparation of written and oral reports and business and social correspondence. *Prereq. 30.501.*

30.503 English for International Students III (2 cl., non-credit)

Advanced work in written and spoken English preparatory to entering 30.504 English I. *Prereq. 30.502.*

***30.594 English — A** (3 cl., 3 q.h.)

Aims and methods of exposition, description and narration; investigation of phrasing and syntax; analysis of essays for content, structure, and effectiveness; theme assignments to develop skill in writing. Aims and methods of argumentation; study of documentation techniques, form, and style of critical essays. *Prereq. none.*

30.595 English — B (3 cl., 3 q.h.)

Practice in library research; analysis and discussion of essays; theme assignments. Continuation of study of documentation techniques and form and style of critical essays.; writing business and social correspondence; theme assignments. *Prereq. 30.594.*

30.600 Elements of Composition (2 q.h.)

An intensive study of grammatical forms and structural patterns of current English.

30.601 Composition and Rhetoric I (2 q.h.)

A detailed examination of the modes of rhetoric, especially exposition and argument, and the exercises in the development of paragraphs and short papers. *Prereq. English Placement Test. (Not open for students who have credit for 30.504.)*

30.602 Composition and Rhetoric II (2 q.h.)

A continuation of 30.601. The stress here is on the short paper, the longer library paper, and formal documentation. *Prereq. 30.601. (Not open for students who have credit for 30.505.)*

30.603 Composition and Rhetoric (Intensive) (4 q.h.)

Same as 30.601 plus 30.602.

30.604 Introduction to Literary Forms I (2 q.h.)

The development of techniques for reading imaginative writing. Short and long fiction are the materials for study, discussion, and two critical papers. *Prereq. 30.602.*

30.605 Introduction to Literary Forms II (2 q.h.)

A continuation of 30.604, but here the materials are poetry and drama. *Prereq.* 30.604.

30.606 Introduction to Literary Forms (Intensive) (4 q.h.)

Same as 30.604 *plus* 30.605.

Each student enrolled in Composition and Rhetoric (30.601 and 30.603) will take a Placement Examination during class. Some students may be requested to register for Elements of Composition (30.600) a 2 q.h. course designed to upgrade the student's background.

Courses required for Liberal Arts Majors are:

- 30.601, 30.602 Composition and Rhetoric I & II (or 30.603 Intensive)
and
30.604, 30.605 Introduction to Literary Forms I & II (or 30.606 Intensive)

For other majors, refer to English requirement listed under major.

30.113 Freshman Writing (4 cl., 4 q.h.)

Important principles of logic and rhetoric applied to exposition and argumentation writing; review of sentence structure, punctuation, and paragraphing; extensive reading and analysis of the essay form; theme assignments.

30.114 Introduction to Literature (4 cl., 4 q.h.)

An introduction to literary forms: poetry, prose fiction, and drama. Intensive reading in various forms, and discussion of different approaches to literature. *Prereq.* 30.113.

30.115 Great Themes in Literature (4 cl., 4 q.h.)

Content determined by instructor, who chooses a theme and a number of books from different periods to illustrate it. Examples: The Hero in Literature; Visions of Utopia; Science Fiction, etc. *Prereq.* 30.114.

BUSINESS MANAGEMENT

Students wishing to elect other business courses should refer to the University College Catalogue and petition for approval by the Committee on Education of Lincoln College.

39.501 Economic Principles and Problems I (2 cl., 2 q.h.)

Macro analysis-National income concepts and determination; macro economic goals and problems; monetary and fiscal policy. *Prereq.* none.

39.502 Economic Principles and Problems II (2 cl., 2 q.h.)

Micro analysis-theory of the firm and market structure; supply, demand, market price; international economics. *Prereq.* 39.501.

39.503 Economic Principles and Problems III (2 cl., 2 q.h.)

Applications of economic principles to selected problem areas; poverty, competition, labor, agriculture, urban. *Prereq.* 39.502.

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39.105 Principles of Economics (4 cl.; 4 q.h.)

Development of macroeconomic analysis; review of national income concepts; national income determination, fluctuation, and growth; role of the banking system and the Federal Reserve System; government expenditures and taxation; international trade; balance of international payments.

39.504 Economics (Intensive) (6 cl., 6 q.h.)

Macro analysis-national income concepts and determination; macro economic goals and problems; monetary and fiscal policy. Micro analysis-theory of the firm and market structure; supply, demand, market price; international economics. Applications of economic principles to selected problem areas; poverty, competition, labor, agriculture, urban. *Prereq. none. (Not open to students who have taken 39.501, 39.502, 39.503.)*

39.510 Statistics for Quality Control (2 cl., 2 q.h.)

Fundamentals of statistical concepts and computations necessary to the understanding of statistical quality control. Frequency distributions, measures of centering and dispersion; computation of average and standard deviation for ungrouped and grouped data; determination of areas under the normal distribution curve; standard deviation of the mean. Combinations and permutations and their use of computer probabilities computations associated with the hypergeometric, binomial, and Poisson distributions. *Prereq. 10.503 or equiv.*

39.511 Statistics I (2 cl., 2 q.h.)

Introduction to the collection and organization of data. Concentration on the nature, computation, and uses of measures of central tendency and variability. *Prereq. 39.503.*

39.512 Statistics II (2 cl., 2 q.h.)

Introduction to statistical inference, parameters of samples, tests of significance, "t" distribution and chi square. *Prereq. 39.511.*

39.513 Statistics III (2 cl., 2 q.h.)

Introduction to the analysis of variance, trend fitting, linear regression, seasonal adjustment and index numbers. *Prereq. 39.512.*

39.514 Statistics (Intensive) (6 cl., 6 q.h.)

Introduction to the collection and organization of data. Concentration on the nature, computation, and uses of measures of central tendency and variability. Introduction to statistical inference, parameters of samples, tests of significance, "t" distribution and chi square. Introduction to the analysis of variance, trend fitting, linear regression, seasonal adjustment and index numbers. *Prereq. 39.503. (Not open to students who have taken 39.511, 39.512, 39.513.)*

41.501 Accounting Principles I (2 cl., 2 q.h.)

The basic concepts and methodology of accounting for service and merchandising businesses. *Prereq. none.*

41.502 Accounting Principles II (2 cl., 2 q.h.)

The problems of income measurement and valuation related to sources and uses of invested capital. *Prereq. 41.501.*

41.503 Accounting Principles III (2 cl., 2 q.h.)

The use of debt and investments in managerial financial decisions, followed by a brief introduction into cost decision analysis. *Prereq. 41.502.*

41.541 Accounting Principles (Intensive) (6 q.h.)

Basic concepts and methodology of accounting for service and merchandising businesses. The problems of income measurement and valuation related to sources and uses of invested capital. The use of debt and investments in managerial financial decisions, followed by a brief introduction into cost decision analysis. (*Not open to students who have taken 41.501, 41.502, 41.503.*)

45.501 Management and Organization I (2 cl., 2 q.h.)

Course describes the environment within which business operates and from this develops the theory and practice of organization. *Prereq. none.*

45.502 Management and Organization II (2 cl., 2 q.h.)

Building on 45.501, this course develops the "what" and "how" of the management process. *Prereq. 45.501.*

45.503 Management and Organization III (2 cl., 2 q.h.)

This course applies the concepts of organization and management to the functional areas of business — marketing, production, personnel and finance. *Prereq. 45.502*

45.541 Law I (2 cl., 2 q.h.)

CONTRACTS: Nature, kinds, and formation of contracts; essential elements; interpretation of contracts. *Prereq. none.*

45.542 Law II (2 cl., 2 q.h.)

AGENCY: Nature, formation and termination of agency relationships; rights and duties of principal and agent, scope of agent's authority. *Prereq. 45.541.*

SALES: Nature of sales contracts; warranties; transfer of title; rights and remedies of seller and buyer. *Prereq. 45.541.*

45.543 Law III (2 cl., 2 q.h.)

NEGOTIABLE INSTRUMENTS: Bills, notes and checks; liabilities and defenses of parties; procedure upon dishonor; discharge. *Prereq. 45.542.*

BUSINESS ORGANIZATIONS: Survey of corporations and partnerships. *Prereq. 45.542.*

45.643 Law (Intensive) (6 q.h.)

CONTRACTS: Nature, kinds, and formation of contracts; essential elements; interpretation of contracts. AGENCY: Nature, formation and termination of agency relationships; rights and duties of principal and agent; scope of agent's authority. SALES: Nature of sales contracts; warranties; transfer of title; rights and remedies of seller and buyer. NEGOTIABLE INSTRUMENTS: Bills, notes and checks; liabilities and defenses of parties; procedure upon dishonor; discharge. BUSINESS ORGANIZATIONS: Survey of corporations and partnerships. Not open to students who have taken 45.541, 45.542, 45.543.

45.561 Statistical Quality Control (2 cl., 2 q.h.)

Description and practical application of the basic statistical quality-control methods for quality assurance, quality control, and quality improvement of products and services; the tools for reducing and controlling the costs of scrap, rework, repair, customer complaints, and warranty. The determination of process capability; use of histograms to identify abnormal variability; the use of quality-control charts for measurable and nonmeasurable quality characteristics, including Shewhart, Multi-Vari, median, percent defective and defects per unit; corrective-action techniques; complying with government quality-control-system requirements; psychological factors in controlling quality. *Prereq. 45.635 or 39.513.*

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45.562 Statistical Quality Control II (2 cl., 2 q.h.)

Continuation of Statistical Quality Control I, covering the application of statistical and probability considerations in acceptance sampling of purchased material, work-in-process, and outgoing products. Methods of predicting sampling results using the hypergeometric, the binomial, and the Poisson distributions; development of the operating characteristic curve for any sampling plan; risks involved in sampling and the concepts of AQL, RQL, AOQL. Use of standard sampling tables to select appropriate sampling plans, including Mil-Std-105 and 414; practical administration of sampling programs, material review boards and quality audit. *Prereq.* 45.561.

45.563 Management of Quality Control (2 cl., 2 q.h.)

Modern concepts of managing the quality function of a company to maximize customer satisfaction at minimum quality cost. The idea of total quality control; measurement of the costs of quality; use of Pareto's Rule to identify the major unsolved quality problems, development of a coordinated program of improvement, organizing for diagnosing the direct causes. The quality control system; improvement and control of vendor quality in process control; outgoing product control; customer quality relations. Organizing of the quality function

45.608 Quality Control (Intensive) (6 q.h.)

Description and practical application of the basic statistical quality-control methods for quality assurance, quality control and quality improvement of products and services; the determination of process capability; the use of quality control charts for measurable and non-measurable quality characteristics. The application of statistical and probability considerations in acceptance sampling of purchased material, work in process, and outgoing products. Methods of predicting sampling results using the hypergeometric, the binomial, and the Poisson distributions; development of the operating characteristic curve for any sampling plan; risks involved in sampling and the concepts of AQL, RQL, AOQL. Not open to students who have taken 45.561, 45.562, 45.563. *Prereq.* 39.513.

45.570 Electronic Data Processing I (2 cl., 2 q.h.)

An introduction to computers including the discussion of numbering and coding systems; examples of typical business problems; and study of basic programming concepts. *Prereq.* none.

45.571 Electronic Data Processing II (2 cl., 2 q.h.)

A survey of available computer systems; price and performance comparison of available input, output, and storage media; discussion of filing and sorting techniques; and presentation of data communications concepts and terminals. *Prereq.* 45.570.

45.572 Electronic Data Processing III (2 cl., 2 q.h.)

A presentation of COBOL, FORTRAN and other programming languages; discussion of business data processing and operations research applications; and a summary of trends in EDP. *Prereq.* 45.571.

45.648 Electronic Data Processing (Intensive) (6 q.h.)

An introduction to computers including the discussion of numbering and coding systems; examples of typical business problems; a study of basic programming concepts. A survey of available computer systems; price and performance comparison of available input, output, and storage media; discussion of

filing and sorting techniques; and presentation of data communications concepts and terminals. A presentation of COBOL, FORTRAN and other programming languages; discussion of business data processing and operations research applications; and a summary of trends in EDP. Not open to students who have taken 45.570, 45.571, 45.572.

48.501 Transportation Management I (2 cl., 2 q.h.)

Basic principles of management and organization, evaluation of all transportation modes, and primary concepts of freight classification and rates. *Prereq. none.*

48.502 Transportation Management II (2 cl., 2 q.h.)

Study of primary management functions — use of tariffs, routing, document processing, analysis of special carrier services and liabilities, and control of private carrier operations. *Prereq. 48.501.*

48.503 Transportation Management III (2 cl., 2 q.h.)

Appraisal of federal transport policy and introduction to factors of physical distribution — inventory control, warehousing, material handling, packaging, and international distribution. *Prereq. 48.502.*

48.504 Transportation Regulation and Promotion I (2 cl., 2 q.h.)

Study of the history and content of the Interstate Commerce Act. *Prereq. 48.503.*

48.505 Transportation Regulation and Promotion II (2 cl., 2 q.h.)

Examination of Administrative Law and Procedure, the Code of Ethics and the General Rules of Practice. *Prereq. 48.504.*

48.506 Transportation Regulation and Promotion III (2 cl., 2 q.h.)

Analysis of cases pertinent to the Commerce Clause and comprehensive preparation for the Interstate Commerce Commission Practitioners Examination. *Prereq. 48.505.*

48.514 Elements of Transportation and Distribution (2 q.h.)

An introduction to regulatory, economic, and management aspects of transportation from the viewpoints of shippers, government, and carrier managers. Topics include: costs, rates, operations, entry, mergers, intercity passenger and urban transportation. A course of general interest to students of business, law or government. *Prereq. none.*

48.591 Transportation Management A (3 cl., 3 q.h.)

Evaluation of all transportation modes, singly and in combination with one another. Analysis of the bill of lading and other transportation documents. Study of primary concepts in transportation pricing; freight classification, classification rule, and freight dates. Study of primary freight-management functions; use of tariffs and rate procedure with carrier bureaus and the Interstate Commerce Commission; routing and consolidation of freight. *Prereq. none.*

48.592 Transportation Management B (3 cl., 3 q.h.)

Special services performed by carriers — diversion and reconsignment, transit, protective services, storage, tracing, switching, pickup and delivery, weighing, loading and unloading; freight — claim procedure and prevention. Management of a private transportation system; exporting and importing; inventory management; materials handling and packaging; warehousing; and factors of industrial location. *Prereq. 48.591.*

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48.593 Air Transportation Management A (3 cl., 3 q.h.)

The economics and regulation of scheduled passenger service and scheduled cargo service. Corporate and general aviation policy-making and procedures. *Prereq. none.*

48.594 Air Transportation Management B (3 cl., 3 q.h.)

Areas of specific study include route structures, equipment, scheduling, operations, pricing, cost analysis, and financing. *Prereq. 48.593.*

FIRE TECHNOLOGY

91.301 Fire Protection Science I (2 cl., 2 q.h.)

An overall review of the fire protection field with the object of providing career orientation. *Prereq. none.*

91.302 Fire Protection Science II (2 cl., 2 q.h.)

An overall review of the public fire service. A study of the basic organization manpower, and utilization of equipment by municipal fire departments. *Prereq. 91.301.*

91.303 Chemistry of Fires and Explosions (2 cl., 2 q.h.)

A study of the chemistry and physics of fire and some of the common hazards. Electrical fires and fires caused by spontaneous heating and ignition are studied as well as flammable liquids, gases, and hazardous chemicals. Field and laboratory investigation of fires are included along with explosions, explosives, and field and laboratory investigations of explosions. *Prereq. 91.302.*

91.304 Fire Prevention I (2 cl., 2 q.h.)

Eliminating human and economic fire losses. Application of empirical and research knowledge in fire prevention measures. *Prereq. none.*

91.305 Fire Prevention II (2 cl., 2 q.h.)

An overview of collaborative efforts, and developing requirements and opportunities, in the interest of fire prevention and its corollary loss control. *Prereq. 91.304.*

91.306 Fire Apparatus Function and Design (2 cl., 2 q.h.)

An analysis of the procurement policies that should be followed in acquiring fire fighting apparatus and equipment with details on the type and amount for good fire fighting efficiency including a discussion of fire department buildings. A review of the physical properties of water that are pertinent to hydraulic calculations and a discussion of hose, streams, and nozzles. *Prereq. none.*

91.307 Fire Protection Systems I (2 cl., 2 q.h.)

A study of the theories and mechanics involved in the operation of fire protection systems and equipment. Fire detection and extinguishing systems of both automatic and manual types are studied including sprinkler, standpipe systems, and water spray protection. *Prereq. none.*

91.308 Fire Protection Systems II (2 cl., 2 q.h.)

A study of fire detection and suppression systems of the manual and automatic type. Types of alarm systems, detectors and actuators are studied and also systems using dry chemicals, carbon dioxide, foam and Halon 1301. Explosion prevention and suppression systems for buildings are also included. *Prereq. 91.307.*

91.309 Fire Service Operations I (2 cl., 2 q.h.)

Fire service operations, its goal and objectives. Management of fire service operations and various aspects of planning, organizing, delegation, staffing, implementing, directing, and controlling. Systems approach to fire service management with management exercises. *Prereq. none.*

91.310 Fire Service Operation II (2 cl., 2 q.h.)

Course Description: Fire Service operation with respect to government and collective bargaining, leadership and discipline, performance analysis, communications and the importance of listening, effective speaking and report writing, records and budgets. Fire service operation public relations in the community and the press. *Prereq. 91.309.*

91.311 Fire Service Operations III (2 cl., 2 q.h.)

Fire defense planning and development. Determining fire defense requirements, organizing the defense and training programs. The fire officer as an instructor, evolution of system, strategy, tactics and other types of emergencies. *Prereq. 91.310.*

91.312 Environmental Physiology (2 cl., 2 q.h.)

Fundamental principles in Human Physiology and the relationship of man to his physical and chemical environment. *Prereq. 12.509.*

AVIATION TECHNOLOGY

96.307 Introduction to Aircraft Design (1 cl., 2 lab., 2 q.h.)

Basic orthographic principles and interpretations of aircraft design. A presentation of basic aerodynamics, structural characteristics of Aircraft, Materials, and Manufacturing Processes. Laboratory work will involve aircraft construction. *Prereq. 10.391 & 11.391.*

96.308 Aircraft Power & Systems (4 cl., 4 q.h.)

Engine types, nomenclature and engine development. Engine cycles and principles, performance, power and its measurement, ratings. Design and construction of parts and their functions. Valve mechanisms and timing. Cooling system, carburation, fuel system ignition system, lubrication and oil system design. Hydraulic, Pneumatic, Electrical and Mechanical systems. Landing gear types, design, loads and limitations. Landing gear retraction systems. General flight control systems including Rudder, elevator, aileron and flaps. Loads and Limitations Deicer systems for flight surfaces, propeller and engine breathing systems. Cabin pressure and oxygen systems. Airspeed and general air-driven instrument systems. *Prereq. None.*

96.309 Introduction to Aerodynamics (1 cl., 1 q.h.)

A non-calculus presentation of basic fluid dynamics and principles of fluid flow. Includes continuity, Bernoulli and momentum equations; streamlines, stream tubes, drag, theory of lift, wing theory, vortex flow, ground effect, stalls, boundary layer, flow separation, control surfaces, stability and balance. *Prereq. 10.308 and 11.318 or concurrently.*

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96.310 Basic Helicopter Aerodynamics (2 cl., 2 q.h.)

General aerodynamics, helicopter components and their functions, loads and load factors, gyroscopic procession principle, performance, introduction to flight manual, helicopter operations in confined areas, and precautionary measures and critical conditions. *Prereq.* 96.392.

96.311 Aviation Meteorology I (2 cl., 2 q.h.)

A survey of the principles of meteorology and structure of the atmosphere. Meteorological instruments and observations. *Prereq.* 11.306 or *equiv.*

96.312 Aviation Meteorology II (2 cl., 2 q.h.)

Weather map interpretation and common aviation weather teletype codes. Physical approach to pressure, temperature, basic thermodynamics, stability, and cloud formations. *Prereq.* 96.311.

96.313 Climatology (2 cl., 2 q.h.)

Climate causes and effects. Climatology of several regions of the world. Application of climatology to problems of airport location and construction, airline operation, and private flying. *Prereq.* 96.312.

96.321 Avionics I (2 cl., 2 q.h.)

Review of basic electronic principles, hazards, aircraft electrical systems, FCC regulations, selection, installation, and service of avionics, strobe lights, radio communications. *Prereq.* 03.309 or 03.395.

96.322 Avionics II (2 cl., 2 q.h.)

Antennas, ADF, omni, localizer, marker beacon, audio systems, transponders. *Prereq.* 96.321.

96.323 Avionics III (2 cl., 2 q.h.)

Glide slope, DME, RNAV, radar, INAV, autopilots. *Prereq.* 96.322.

96.324 Introductory Avionics (4 cl., 4 q.h.)

Basic coverage of electronics including: vacuum tube principles, semiconductor physics principles, power supplies, amplifiers, oscillators, and pulse circuits. Also generator and motor principles and applications. Basic concepts of avionics, electrical hazards, aircraft electrical systems, electrical instruments, strobe lights, FCC regulations, radio communications and antennas. *Prereq.* 11.319.

96.325 Avionics (4 cl., 4 q.h.)

Selection, installation, and servicing of avionics, automatic direction finders, marker beacons, omnirange and localizers, audio switching systems, ATC transponders, glide slope systems, distance measuring equipment, autopilots, and radar. *Prereq.* 96.324.

96.326 Avionics Laboratory I (3 lab., 2 q.h.)

Experiments dealing with laboratory techniques in measuring instruments, signal generators, and oscilloscopes. Junction and field effect transistor characteristics. Filter circuits. Q meter, coils with iron cores. Vacuum and semi-conductor diode, power supplies including the regulated type, silicon controlled rectifier, transistor amplifiers. *Prereq.* 96.324 and 96.325.

96.327 Avionics Laboratory II (3 lab., 2 q.h.)

Experiments in oscilloscopes, double tuned transformers, audio frequency oscillators, modulation of class C amplifiers, the diode detector, RF and crystal oscillators. Testing of a radio receiver. Reactance modulators, F.M. Detectors. *Prereq.* 96.326.

96.328 Avionics Laboratory III (3 lab., 2 q.h.)

Experiments in navigation equipment for aircraft. *Prereq.* 96.327.

***96.331 Primary Flight I** (2 lab., 1½ q.h.)

Elements of flight principles (pre-flight operations), operation of aircraft systems. Taxi operations and ground performance. Basic flight maneuvers. Take-offs and landings. *Prereq.* Class I or II, medical certificate.

***96.332 Primary Flight II** (2 lab., 1½ q.h.)

Review of basic flight maneuvers. Advanced maneuvers and stall procedures. Short field take-offs and landings. Power approaches and landing under varying conditions. Emergency operation of aircraft equipment. *Prereq.* 96.331. *Student must have a current endorsement for solo flight.*

***96.333 Primary Flight III** (2 lab., 1½ q.h.)

Cross country flight planning and flight. Lost procedures and related emergencies. Use of radio and navigation equipment under V.F.R. (visual flight rules). Control of aircraft by reference to flight instruments only. Private license qualifications complete. *Prereq.* 96.332. *Student must have a current endorsement for solo cross country flight.*

***96.341 Commercial Flight I** (2 lab., 1½ q.h.)

Review of all primary flight maneuvers. Advanced maneuvers. Precision take-offs and landings, cross wind techniques. *Prereq.* 96.333.

***96.342 Commercial Flight II** (2 lab., 1½ q.h.)

Precision flight maneuvers — spirals about a point. Shallow and steep onpylon eights, 720° steep power turns. Solo practice. *Prereq.* 96.341.

***96.343 Commercial Flight III** (2 lab., 1½ q.h.)

Continuation of precision maneuvers: lazy eights, chandelles, maneuvers at minimal controllable airspeed. Continued related simulator practice. Night flying. Basic instrument flying. *Prereq.* 96.342.

***96.344 Commercial Flight IV** (2 lab., 1½ q.h.)

Stalls from all normally anticipated flight altitudes with and without power. Simulated emergency procedures and forced landings. Basic instrument flying. *Prereq.* 96.343.

***96.345 Commercial Flight V** (2 lab., 1½ q.h.)

Advanced cross country flight planning and navigation. Advanced radio communications and traffic procedures. Review of all maneuvers and procedures. (Certification F.A.A.) *Prereq.* 96.344.

***96.351 Instructional Flight I** (2 lab., 1½ q.h.)

Fundamentals of flight instruction. Development of student-instructor relationship and rapport. Teaching procedures in flight training. Instructor responsibilities and record maintenance. Instructor flight demonstrations. Qualification and certification by F.A.A. *Prereq.* 96.345 & 96.354 or concurrently.

*See Flight Tuition Schedule, pages 47 and 48.

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***96.352 Instructional Flight II** (2 lab., 1½ q.h.)

Continuation of fundamentals of instruction, flight training procedures, student instructor relationship, review of all maneuvers and flight demonstrations. Certification by F.A.A. *Prereq.* 96.351.

96.354 Principles of Flight Instruction (2 cl., 2 q.h.)

Fundamentals and principles of instructing, learning concepts of teacher student communications. Use of special flight teaching aids, and training procedures. *Prereq.* 96.345 or equivalent test.

***96.355 Instrument Instructor Flight A** (2 lab., 2 q.h.)

Fundamentals and procedures for teaching operating limitations of all instruments, control of rate of climb and descent to pre-determine altitudes, procedures for coping with unusual altitudes and critical situations.

***96.356 Instrument Instructor Flight B** (2 lab., 2 q.h.)

Principles and procedures of teaching methods in instrument flight planning and enroute weather analysis, radio communication and enroute navigation and orientation. Oral exam and flight test preparation.

96.357 Multi-Engine Flight (2 lab. 1½ q.h.)

Preparation for a F.A.A. multi-engine rating test which includes an oral exam on the aircraft documents performance, and operating characteristics. Multi-engine flight instruction on basic piloting techniques and emergency procedures.

96.358 Helicopter A (2 lab., 2 q.h.)

Elements of flight principles, operations of helicopter systems. Hovering flight. Take-off, hover, forward climb, pattern, power-glide approach, transition to hovering, vertical landing. Square patterns. Crosswind take-off and landing. Running take-off and landing autorotations. *Prereq.* Commercial Fixed Wing License. Class I or II medical certificate.

96.359 Helicopter B (2 labs., 2 q.h.)

Review and practice take-offs, landings, all maneuvers plus settling with power and recovery, quick stops, precision pattern and landing. Solo practice. Dual review for FAA Flight Test. *Prereq.* Helicopter A 96.358.

96.360 Aircraft Analysis I (2 cl., 2 q.h.)

A presentation of subsonic aerodynamics and structural characteristics of aircraft. *Prereq.* 11.317.

***96.361 Instrument Flight I** (2 lab., 1½ q.h.)

Instrument flight planning, preparing and filing. Aircraft performance (range and fuel requirements). Required instruments and their proper use. Basic instrument flying, needle ball and airspeed only. Instrument use in turns, climbs, descents, stalls and approach speeds. Recovery from unusual altitudes. Airwork using all altitudes instruments. *Prereq.* 96.345.

***96.362 Instrument Flight II** (2 lab., 1½ q.h.)

Radio navigation while flying on instruments. Use of L.F. (low frequency), omni-range, or A.D.F. (automatic direction finder). Advanced radio communications. Instrument approaches, holding procedures, missed approach procedures, emergencies (radio and instrument malfunctions). Air traffic control instructions and procedure. Rating by F.A.A. *Prereq.* 96.361.

96.370 Air Cargo Practices A (3 cl., 3 q.h.)

Study of airline and air freight forward cargo practices with emphasis on regulation, economics, marketing, and handling and organizational aspects.

96.371 Air Cargo Practices B (3 cl., 3 q.h.)

A continuation through case studies of air cargo operations.

96.372 Airline Traffic and Sales A (3 cl., 3 q.h.)

Functions of the traffic & sales department, relationship between the travel agencies and the airlines, relationships with other carriers, reservations and the procedures involved in the transportation of one passenger of NCA and another carrier, airlines promotion, the reservation agent and training.

96.373 Airline Traffic and Sales B (3 cl., 3 q.h.)

Tariffs and schedules with an explanation of how flight times are established, flight frequencies, new routes, and the establishment of ticket fares. Aspects of cargo and charters.

96.376 General Aviation Operations A (3 cl., 3 q.h.)

A presentation of the major functions of airport management; organization, zoning, adequacy, financing, revenues and expenses, evaluation and safety. A study of the airport and its socioeconomic effect on the community. *Prereq.* none.

96.377 General Aviation Operations B (3 cl., 3 q.h.)

A continuation through case studies of General Aviation Operations. *Prereq.* 96.376.

96.378 Air Traffic Control Systems A (3 cl., 3 q.h.)

Survey of the total aero-space system and management. Air traffic administrative coordination. Regional responsibilities. NAFEC organization of center, tower, and station.

96.383 Advanced Aircraft Analysis (2 cl., 2 q.h.)

A presentation of supersonic aerodynamics and structural characteristics of aircraft. *Prereq.* 11.318.

96.384 Aviation History (3 cl., 3 q.h.)

Historical survey of efforts in manned flight, aircraft development, pioneers in flight, general aviation, military and commercial aspects of flight and effects on modern civilization. *Prereq.* none.

***96.390 Pilot Refresher** (2 lab., 1½ q.h.)

This course consists of 24 hours of concentrated instruction and evaluation of pilot proficiency in advanced instrument flying and instructional flight procedures. It involves simulator flight, aircraft flight, ground instruction and the updating of current procedures in flight instruction and flight planning procedures. *Prereq.* special permission of flight director.

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96.391 Air Science & Navigation A (3 cl., 3 q.h.)

Aircraft structures and components aerodynamic forces, airfoil terminology — lift, and drag coefficient, boundary layer problems and control, Reynolds Number and Scale Effect. Earth in space, latitude, longitude, properties and components of the atmosphere, map projections, dead reckoning, reciprocating engine theory, gas turbine engine theory, planform effects, aircraft weight and balance.

96.392 Air Science & Navigation B (3 cl., 3 q.h.)

Radio navigation, VOR, ADF, DME and TACAN, federal air regulations, airplane performance (climb, range, altitude, takeoff, and landing), aircraft propeller theory and operation, specific aircraft substructures (landing gear et. al.) advanced DR navigation problems (radius of action, unknown wind), general review. *Prereq.* 96.391.

96.393 Advanced Air Science & Navigation A (3 cl., 3 q.h.)

Supersonic aerodynamics physiologic factors of flight, instrument flight charts, IFR planning, instrument flight rules, static and dynamic axial stability of aircraft, control movements and forces, stability problems. *Prereq.* 96.392.

96.394 Advanced Air Science and Navigation B (3 cl., 3 q.h.)

Spins and spin recoveries, flying high performance aircraft, area charts, arrival and departure, SID charts, clearance notation, aircraft performance, applications of aerodynamics to specific problems of flight, helicopter stability, structural strength limitations, doppler radar, precision approach radar & airport surveillance radar, loran, consolan, pressure pattern flight. *Prereq.* 96.393.

96.395 Meteorology & Climatology A (3 cl., 3 q.h.)

A survey of the principles of meteorology and structure of the atmosphere Meteorological instruments and observations. Weather map interpretation and common aviation weather teletype codes. *Prereq.* 11.392.

96.396 Meteorology & Climatology B (3 cl., 3 q.h.)

Physical approach to pressure, temperature, basic thermodynamics, stability, and cloud formations. Climate causes and effects. Climatology of several regions of the world. Application of climatology to problems of airport location and construction, airline operation, and private flying. *Prereq.* 96.395.

96.399 Flight Physiology (2 cl., 2 q.h.)

The study of the physical and chemical processes of the body. Functions of the living body and its environment. Adaptive changes of function of the body resulting from a change in environment with emphasis on flight. The effects of medication on the function and reactions of the body with emphasis on flight. The effects of the state of the mind on the function and reactions of the body with emphasis on flight.

96.401 Aircraft Engines I (2 cl., 2 q.h.)

Engine types, nomenclature and engine development. Engine cycles and principles, performance, power and its measurement, ratings. Design and construction of parts and their functions. Valve mechanisms and timing. Cooling system, carburetion, fuel system, ignition system, lubrication and oil system design.

96.402 Aircraft Engines II (2 cl., 2 q.h.)

A presentation of turbo-engine types and their development. Radial flow and axial flow types, turbo-prop, compounding, ram jets, pulse jets and rockets. Principles of combustion and propulsion, performance, power, thrust and their measurement, design and construction. Fuel, lubrication, and ignition systems.

96.425 Chronology of Aviation I (2 cl., 2 q.h.)

1903-1939; early flights 1903-1914 era, World War I 1914-1918 era, airmail and barnstorming era, famous pilots and company histories traced 1920-1939 era including history of air racing. *Prereq. none.*

96.426 Chronology of Aviation II (2 cl., 2 q.h.)

1939-present; World War II 1939-1945 era, all personalities and company histories traced, post World War II up to Apollo 17, final flight in Apollo program. *Prereq. none.*

96.430 Aviation Preventive Maintenance (2 cl., 2 q.h.)

For pilots and aircraft owners. Airframe and powerplant nomenclature, structures, and systems. Maintenance that a pilot can and is allowed to do to the airframe and engine of his aircraft, proper techniques. *Prereq. none.*

96.431 Aircraft Systems (2 cl., 2 q.h.)

Hydraulic, Pneumatic, Electrical and Mechanical systems. Landing gear types, design, loads and limitations. Landing gear retraction systems. General flight control systems including Rudder, elevator, aileron and flaps. Loads and limitations, Deicer systems for flight surfaces, propeller and engine breathing systems. Cabin pressure and oxygen systems. Airspeed and general air-driven instrument systems. *Prereq. None.*

96.432 Aircraft Laboratory (2 lab., 1 q.h.)

Aircraft construction methods and techniques will be applied to the construction of aircraft components.

NEW GENERAL INTEREST COURSES

In response to repeated requests, we are offering several new courses in technology which do not require students to have a mathematical background. These courses have a three fold purpose: First, we would like to encourage liberal arts and business students to get interested in technology. Second, we hope that new students without mathematic backgrounds will be sufficiently attracted to science and technology that they will ultimately undertake our regular curricula. Lastly, these courses should serve to clarify the complexities of our technological world for anyone who chooses to undertake them.

01.401 Technology of Modern Architecture I (2 cl., 2 q.h.)

The course covers the general background of architectural styles both historical and contemporary with emphasis on the engineering design aspects and construction procedures concerned with the various types of buildings involved. *Prereq. none.*

01.402 Technology of Modern Architecture II (2 cl., 2 q.h.)

The course covers contemporary architecture and concerns itself with an emphasis on the engineering design aspects and construction procedures required for modern buildings. *Prereq. none.*

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02.401 Man and Materials (2 cl., 2 q.h.)

The consumption of earth's raw materials has increased drastically creating serious ecological problems. Metals, plastics, ceramics, concrete, etc. all evolve from substances in the earth's crust, unfortunately however, they are not properly recycled because costs have always come before environment. This course will explore what action man may take now to prevent chaos in the future. *Prereq. none.*

03.401 Electric Devices and Systems I (2 cl., 2 q.h.)

A non-mathematical examination of electric and electronic devices which have become a part of daily living. An analysis of functional demands and their realization in elementary working systems. Ratings and applications of devices including light, heat, and mechanical energy converters. *Prereq. none.*

03.402 Electric Devices and Systems II (2 cl., 4 q.h.)

A continuation of 03.401, discussion of modern communications systems, radio, TV, telephone. Economic trade-off in designs; energy sources and energy conversion, transmission systems. Rate basis implications of increased load base. Atomic vs. fossil fuels. *Prereq. 03.401.*

09.401 Interpretation of Industrial Drawings (2 cl., 2 q.h.)

Emphasis on the understanding of the concepts conveyed by working engineering drawings. Practice is provided in reading and interpreting the standard conventions and symbols used to transmit the designer's ideas to the tradesman or craftsman. No formal drafting will be done, although a few free hand sketches will be encouraged. *Prereq. none.*

10.401 Foundations of Mathematics I (2 cl., 2 q.h.)

The many branches of mathematics. Origins of arithmetic and algebra, and their place in early societies. *Prereq. none.*

10.402 Foundations of Mathematics II (2 cl., 2 q.h.)

Mathematics and the scientific revolution. Functions, graphs, concepts of the calculus. *Prereq. 10.401.*

10.403 Foundations of Mathematics III (2 cl., 2 q.h.)

Mathematics today: analysis, probability, statistics, and other topics. The mutual dependence of mathematics and computers. Math in social sciences, physical sciences, and business. *Prereq. 10.402.*

11.401 Man's Physical Environment I (2 cl., 2 q.h.)

The nature of energy. Its sources and the economics of its expenditure. The harmonious interactions of natural physical systems and the conservations which govern them. Man's exploitations of these laws. The cyclic nature of useful physical processes; reversible and irreversible. *Prereq. none.*

11.402 Man's Physical Environment II (2 cl., 2 q.h.)

The methods by which man gains knowledge of two inscrutable areas of his environment. Effects of scale from astro-physical to atom. The paradoxical implications of this knowledge and its effect on man's dealings with his environment. *Prereq. none.*

LINCOLN COLLEGE ENGINEERING TECHNOLOGY

EVENING COURSES LISTED WITH EQUIVALENT DAY BET COURSES

Evening Courses		Day BET Courses	
02.301, 02.302	Mechanics (Statics) I, II	02.411	Mechanics A
02.303, 02.304	Mechanics (Statics) III, Mechanics (Dynamics) I	02.412	Mechanics B
02.305, 02.306	Mechanics (Dynamics) II, III	02.413	Mechanics C
02.321, 02.322	Stress Analysis I, II	02.414	Stress Analysis A
02.323, 02.324	Stress Analysis III, Adv. Stress Analysis I	02.415	Stress Analysis B
02.325, 02.326	Advanced Stress Analysis II, III	02.416	Stress Analysis C
02.327, 02.328	Mechanical Design, I, II	02.417	Mechanical Design A
02.329	Mechanical Design III	02.418	Mechanical Design B
02.351, 02.352	Thermodynamics I, II	02.421	Thermodynamics A
02.353, 02.357	Thermodynamics III, Heat Engineering (Refrigeration) I	02.422	Thermodynamics B
02.358, 02.359	Heat Engineering II, III	02.423	Thermodynamics C
02.354	Heat transfer	02.414	Thermodynamics D
02.355, 02.356	Heat Transfer II, III	02.425	Thermodynamics E
02.341, 02.342	Materials I, II	02.431	Materials A
02.343, 02.344	Materials III, Applied Metallurgy I	02.432	Materials B
02.345, 02.346	Applied Metallurgy II, III	02.433	Applied Metallurgy
01.341, 01.342	Fluid Mechanics I, II	02.441	Fluid Mechanics A
01.343	Fluid Mechanics III	02.442	Fluid Mechanics B
02.337, 02.338	Mechanical Vibrations I, II	02.451	Mechanical Vibrations
02.334, 02.335	Exp. Stress Analysis I, II	02.452	Experimental Stress Analysis
02.331	Mechanical Technology Laboratory I	02.462	Mechanical Technology Laboratory I
02.332	Mechanical Technology Laboratory II	02.463	Mechanical Technology Laboratory II
02.333	Mechanical Technology Laboratory III	02.464	Mechanical Technology Laboratory III
02.361	Heat Technology Laboratory I	02.465	Heat Technology Laboratory I
02.362	Heat Technology Laboratory II	02.466	Heat Technology Laboratory II

Evening Courses		Day BET Courses	
03.306	Electrical Measurements (Plus 2 q.h.)	03.410	Electrical Measurements
03.320, 03.321	Electricity & Electronics I, II	03.420	Electricity & Electronics I
03.322	Electricity & Electronics (Plus 2 q.h.)	03.421	Electricity & Electronics II
11.322, 11.323	Semiconductor Physics I, II	03.440	Physical Electronics
03.331, 03.333	Energy Conversion I, III	03.430	Energy Conversion
03.301, 03.302	Circuit Theory I, II	03.451	Circuit Analysis I
03.303, 03.304	Circuit Theory III, IV	03.452	Circuit Analysis II
03.361, 03.362	Transients in Linear Systems I, II	03.453	Circuit Analysis III
03.363	Transients in Linear Systems (Plus 2 q.h.)	03.354	Circuit Analysis IV
10.324, 10.325	Differential Equations I, II	03.460	Engineering Analysis I
03.391, 03.392	Computer Technology Laboratory I, II	03.470	Digital Computers
03.377, 03.378	Control Systems I, II	03.477	Control Engineering I
03.379	Control Systems III (Plus 2 q.h.)	03.478	Control Engineering II
03.397, 03.398	Optical Instrumentation I, II	03.490	Optical Instrumentation
04.381, 04.383	Nuclear Technology I, III	04.481	Nuclear Technology
09.351	Principles of Computer Programming I	09.421	Principles of Computer Prog. I
09.352	Principles of Computer Programming II	09.422	Principles of Computer Prog. II
09.353	Principles of Computer Programming III	09.423	Principles of Computer Prog. III
09.311	Engineering Graphics I	09.461	Engineering Design Graphics I
09.312	Engineering Graphics II	09.462	Engineering Design Graphics II
09.313	Engineering Graphics III	09.463	Engineering Design Graphics III
09.307	Electrical & Electronic Graphics I	09.461	Engineering Design Graphics I
09.308	Electrical & Electronic Graphics II	09.462	Engineering Design Graphics II
09.309	Electrical & Electronic Graphics III	09.463	Engineering Design Graphics III

Evening Courses

09.314, 09.315	Engineering Design I, Engineering Design II
10.307	College Algebra & Trig. I
10.308	College Algebra & Trig. II
10.320	Calculus I
10.321, 10.322	Calculus II, III
10.323, 10.324	Calculus IV, Differential Equations I
10.325, 10.326	Differential Equations II, III
11.317	Physics I
11.318	Physics II
11.319	Physics III
11.373	Physics Lab. I
11.374	Physics Lab. II

Day BET Courses

09.464	Engineering Design Graphics IV
10.307	College Algebra & Trig. I
10.308	College Algebra & Trig. II
10.320	Calculus I
10.421	Calculus A
10.422	Calculus B
10.423	Differential Equations
11.317	Physics I
11.318	Physics II
11.319	Physics III
11.373	Physics Laboratory I
11.374	Physics Laboratory II

the lincoln college faculty

THE STRENGTH of an educational institution lies in the quality of its faculty. This is especially true in a college devoted to the training of mature men and women, many of whom are already employed in their chosen professions.

The instructional staff of Lincoln College is composed of professional academicians from Northeastern University and neighboring educational institutions and practicing professionals from the scientific and industrial community of Greater Boston. The theoretical training and practical experience represented by this combination of specialists is ideally suited to the technology programs they teach and the adult students they serve.

The faculty are selected for their ability and active interest in the welfare of ambitious part-time students. They are men and women of culture and high ideals and are qualified by educational training and professional experience to teach effectively in their respective fields.

A staff of experienced professional educators who serve as program and course consultants, constitutes the Academic Advisory Council and Curriculum Advisory Committee of the College. They guide, supervise, and assist with the administration of courses and programs.

THE FACULTY

The following is an alphabetical list of the faculty of Lincoln College; degrees earned (year of appointment), professional affiliation, titles and Lincoln College department are listed.

Charles D. Aaronson, B.S., M.S.

Electrical Engineering Manager for McPherson Instr. Corp.
Electrical Engineering Technology (1964)

Sherif M. Abdel-Monem, B.S., M.S.

Teaching Assistant, Electrical Engineering, Northeastern University.
Electrical Engineering Technology (1973)

Arnold W. Almquist, Jr., B.S., M.Ed.

Instructor of Mathematics, Needham High School.
Mathematics (1967)

George H. Anderson, Commercial Art Diploma

Professional Artist; Free Lance Technical Illustrator.
Engineering Graphics and Computation (1956)

Will C. Anderson, B.S., M.S.

Programming Engineer, Raytheon Corporation.
Engineering Graphics and Computation (1968)

*Robert B. Angus, Jr., B.S., M.S., P.E. (Mass.)

Manager of Field Development, Technical Education Research Centers.
Electrical Engineering Technology (1948)

Victor S. Aramati, M.S., B.S.

Bell Telephone Laboratories
Mechanical Engineering Technology (1970)

Nathon Aron

Engineer, Raytheon Inc.
Electrical Engineering (1973)

Louis E. Ashley, A.B., M.Ed.

Product Development Section, Arthur D. Little, Inc.
Mechanical Engineering Technology (1966)

*Robert J. Averill, B.S., M.S.

Cambridge Electron Accelerator, Harvard University.
Course Consultant for Electrical Engineering Technology (1957)

*Russell H. Babcock, S.B., S.M., P.E. (Mass., Maine, N.H., R.I., Vt., Conn.)

Diplomate, American Academy of Environmental Engineers;
Chief Water Resources Engineer, C. E. Maguire, Inc.
Civil Engineering Technology (1954)

John C. Balsavich

Laboratory Supervisor, Electrical Engineering, Northeastern University.
Electrical Engineering Technology (1957)

Westley P. Barry, BBA, Eng. & Mgt.

McBar Associates.
Electrical Engineering Technology (1971)

Samuel W. Bartol, B.A.

CFI Multiengine & Instrument Ratings, Wiggins Airways.
Aviation (1969)

*Appointed to the rank of Senior Lecturer

- Adolph Baumann, B.S., P.E. (Mass.)
Lecturer, Electronics Engineering, Northeastern University.
Electrical Engineering Technology (1955)
- Fred E. Bellows, Jr., B.S., M.Ed.
Principal, East Elementary School, Sharon.
Aviation Technology (1968)
- Walter E. Benulis, B.S., M.S.
Research Associate, M.E. Department, Northeastern University.
Mechanical Engineering Technology (1969)
- Matteo P. Berardi, B.S., M.S.
Supervisor, Materials Technology.
Mechanical Engineering Technology (1960)
- Maureen P. Berggren, B.S.
Mathematics (1965)
- Alfred L. Birch, B.S.E.E., P.E. (Mass.)
Dept. Head, Development Engineering, Western Electric Co.
Electrical Engineering Technology (1965)
- Emmanuel E. Bliamptis, B.S., S.M., M.A., P.E. (Mass.)
Research Physicist, Air Force Cambridge Research Labs.
Physics (1965)
- Joseph I. Bluhm, S.B., M.S., P.E. (Mass., Ohio)
Chief Mechanics Research Laboratory,
Army Materials and Mechanics Research Center.
Mechanical Engineering Technology (1966)
- Sidney Bluhm, A.B., Ed.M., A.M.
Head, Science Department, Boston Technical High School (Retired).
Physics (1965)
- *Edward Bobroff, B.M.E., P.E. (Mass.)
Chief Engineer, Combat Systems, Boston Naval Shipyard.
Course Consultant for Mathematics (1946)
- Edward J. Booth, A.B., Ed.M.
Associate Professor of Mathematics, Northeastern University.
Mathematics (1956)
- Roland J. Boucher, B.A., M.S.
Research Physicist, Air Force Cambridge Research Lab.
Aviation Technology (1968)
- James W. Bougioukas, B.S., P.E. (Mass.)
Principal Civil Engineer Mass. D.P.W..
Engineering (1971)
- *Kenneth E. Bourque, B.S., M.S.
Gauthier Imported Cars.
Electrical Engineering Technology (1959)
- Alan Bradshaw, B.S., M.S.
Chelmsford School System.
Mathematics (1966)
- *Eugene G. Branca, S.B., S.M.
Assistant Headmaster (Retired), Hyde Park High School.
Mathematics (1946)
- Donald H. Breslow, S.B., M.S.
Director of Engineering, Measurement Systems Division, Itek Corp.
Electrical Engineering Technology (1959)

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Alfred E. Bresnahan, B.S., M.A.

Chairman, Mathematics Dept., Lynn English High School.

Mathematics (1967)

Donald C. Brock, B.S., M.S.

Mathematics Instructor, Needham High School.

Mathematics (1965)

Bruno Brodfeld, B.S.C.E. (Mass., La.)

P.E. Chief Environmental Engineer, Stone & Webster Engineering Corporation.

Civil Engineering Technology (1965)

*Franklyn K. Brown, B.S.Ed., M.Ed.

Associate Professor, Graphic Science, Northeastern University.

Course Consultant for Engineering Graphics and Computation (1955)

William A. Brown, B.S.E.E., M.S.E.E., J.D.

Assistant Professor of Law, Suffolk University Law School.

Electrical Engineering Technology (1965)

Jeffrey L. Bruce, B.S., M.A.

Instructor, Dover-Sherborn Regional High School.

Mathematics (1969)

William O. Bruehl, B.S.

Associate Professor, Mechanical Engineering, Northeastern University (Retired).

Course Consultant for Mechanical Engineering Technology (1956)

*Morris H. Burakoff, B.S., P.E. (Mass.)

Department Chief, Western Electric Company.

Electrical Engineering Technology (1957)

George Burdick, A.B., P.E. (Mass.)

Hudson Institute, Hudson, Mass.

Electrical Engineering Technology (1950)

Ralph A. Buonopane, B.S., M.S., Ph.D.

Associate Professor of Chemical Engineering, Northeastern University.

Chemical Engineering Technology (1964)

Donald Burgess, A.B., M.Ed.

Head of Department, Boston English High School.

Mathematics (1967)

Steven Butcher, Jr., S.B., M.S.

Technical Staff, The Mitre Corporation.

Electrical Engineering Technology (1967)

Gregory J. Cahill

Engineer, Jackson Moreland

Mechanical Engineering Technology (1968)

*Leroy M. Cahoon, B.S.C.E., M.S., P.E. (Mass.)

Associate Professor of Civil Engineering, Northeastern University.

Program Consultant for Civil Engineering Technology (1962)

John J. Callahan, B.S., M.Ed., M.A.

Assistant Professor, Boston State College.

Mathematics (1969)

*Frank R. Cangiano, B.S., Ed.M.

Instructor in Science and Mathematics, Medford High School.

Mathematics (1957)

Barry S. Canner

Wiggins Airways

Aviation Technology (1970)

Edgar T. Canty, B.S., M.S.

Director Academic Computing Services.

Mathematics (1966) Babson College

*Richard I. Carter, B.S., M.S., P.E. (Mass.)

Associate Professor, Electrical Engineering and Director of Computation Center,
Northeastern University.

Engineering Graphics and Computation (1955)

*Walter J. Casey, A.B., M.Ed., M.A.T.

Head of Department, Brighton High School.

Mathematics (1955)

*Walter J. Charow, B.S.E.E., M.S.E.E., P.E. (Mass.)

Branch Chief, Avionics, Electronics System Div., U.S.A.F.

Electrical Engineering Technology (1955)

Bruce B. Claflin, A.B., M.S.

Associate Professor of Mathematics, Northeastern University.

Course Consultant for Mathematics (1964)

Philip J. Clang, B.S., P.E. (Conn., Mass., Pa.)

Project Manager, United Engineers & Constructors, Inc.

Mechanical Engineering Technology (1957)

John J. Cochrane, B.S., M.S., Ph.D., P.E. (Mass.)

Associate Professor of Civil Engineering, Northeastern University.

Civil Engineering Technology (1972)

Matthew H. Cohn, B.S.

Senior Engineer, Group Leader, Raytheon Company.

Engineering Graphics and Computation (1969)

Leonard M. Conlin, A.B., Ed.M.

Mathematics Teacher, Framingham North High School.

Mathematics (1967)

Joseph V. Connolly, B.S., M.Ed.

Head of Department, Boston Latin School.

Physics (1965)

*Roger T. Connor, A.B., M.Ed.

Principal — Milton High School.

Mathematics (1953)

*Robert J. Connors, B.S.

Manager of Technology, Electronic Systems, Sylvania Electric Products, Inc.

Electrical Engineering Technology (1948)

*Edward M. Cook, A.B., A.M.

Professor of Mathematics, Northeastern University.

Program Consultant for Mathematics (1941)

Joseph Z. Cooper, B.S.E.

Principal Engineer, Raytheon Company.

Engineering Graphics and Computation (1967)

Robert C. Copeland, B.S.E.E., S.M.

WCVB-TV, Chief Meteorologist.

Aviation Technology (1968)

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James B. Corscadden, B.S., M.Ed., A.M.T.
Head of Department, South Boston High School.
Mathematics (1967)

Richard E. Cox, B.S.M.E., M.S., P.E. (Mass.)
Professional Engineer, Technical Operations.
Mechanical Engineering Technology (1967)

David C. Crockett, B.S., M.S.
Consultant
Mechanical Engineering Technology (1969)

Thomas J. Crowley, S.B., M.S., P.E. (Mass.)
Research Associate, Harvard University School of Public Health.
Mechanical Engineering Technology (1966)

Mukti Lal Das, B.S., M.S., Ph.D., P.E. (Mass.)
Structural Engineer, Stone and Webster Corporation.
Civil Engineering Technology (1972)

*Herbert R. Davenport, B.S.
Standards Engineer, General Radio Company.
Electrical Engineering Technology (1948)

Warren C. Dean, A.B., M.A.
Associate Professor of Mathematics, Northeastern University.
Course Consultant for Mathematics (1941)

Dean A. De Marre, A.E., B.S., Sc.D.
Consulting Editor, Medical Electronics & Data
President CTR, Inc., Adjutant Professor at Indiana Northern University.
Electrical (1967)

Thomas R. Deveney, B.S.
Curriculum Design Specialist, Copley Sq. High School.
Mathematics (1965)

Giles C. Dilg, B.S.E.E., M.S.E.E., P.E. (Mass.)
Senior Project Engineer, Raytheon Corp.
Engineering Graphics & Computation (1966)

Marie Dolansky, BS., Ed.M., Ed.D., C.G.A.
Mathematics 1964

Mark Domaszewicz, B.E.E., M.S.E.E.
Senior Engineer, Raytheon Company.
Electrical Engineering Technology

Paul I. Douglas, B.S., M.S.
Teaching Assistant, Mechanical Engineering, Northeastern University.
Mechanical Engineering Technology (1973)

Leonard F. Dow, B.S.E.E., MS., P.E. (Mass.)
Boston Edison Company, Staff Engineer.
Electrical Engineering Technology (1970)

Paul Crowther Dow, Jr., B.S., M.S.E., Ph.D.
Engineering Management, Avco Corporation.
Electrical Engineering Technology (1973)

- Paul A. Dunkerley, B.S., S.M., P.E. (Mass.)
Associate Professor of Civil Engineering, Tufts University.
Civil Engineering Technology (1968)
- Philip W. Dunphy, B.Sc., M.Ed.
Associate Professor of Cooperative Education, Northeastern University.
Academic Counsellor (1967)
- William V. Durante, B.S., M.Ed., M.A.
Head of Mathematics Dept., Boston Latin School.
Mathematics (1964)
- John A. Ebacher, B.S., M.S.
Engineer, General Electric Co.
Mechanical Engineering Technology (1967)
- Charles P. Englehardt, B.S., M. Arch.
Architect, Corp. of Engineers.
Engineering Graphics & Computation (1942)
- Adolf J. Erikson, B.B.A., M.B.A., P.E. (Mass.)
President, A.E. Engineering Corporation.
Engineering Graphics and Computation (1966)
- *Martin J. Feeney, S.B., Ed.M.
Principal Emeritus, Boston Public Schools.
Mathematics (1957)
- Warren G. Ferzoco, A.E., B.B.A., M.Ed.
Dean, Cambridge High and Latin School.
Engineering Graphics and Computation (1966)
- Charles Field, B.S., M.Ed.
Professor of Cooperative Education, Northeastern University.
Academic Counsellor (1967)
- Robert G. Field, S.B.E.E., M.B.A.
Electrical Engineering (1972)
- *William D. Finan, A.B., M.A., D.Ed.
Reading Director, Needham Public Schools.
Course Consultant for Mathematics (1946)
- Paul M. Fitzgerald, B.S.
Special Hazards Engineer, Factory Mutual Research.
Fire Technology (1973)
- *Louis A. Fiore, A.E., B.B.A.
Mech. Engineer, Design Checker, American Science and Engineering, Inc.
Engineering Graphics and Computation (1956)
- A. Ralph Fiore, Jr., B.S.E.E., M.S. Eng. Mgt., P.E. (Mass.)
Computation & Graphics (1969)
- *Robert F. Ford, B.S.E.E., M.S.E.E.
Engineering Manager, Special Systems, Data General.
Electrical Engineering (1962)
- Earlwood T. Fortini, A.B., P.E. (Mass.)
Manager Graphic Products Development, Compugraphic Corp.
Mechanical Engineering Technology (1957)
- Robert M. Fox, A.S., B.S., M.B.A.
Gerber Electronics.
Mathematics 1969
- *John L. Freedman, B.S., P.E. (Mass.)
Instructor, Bryant & Stratton and Northeastern University.
Course Consultant for Electrical Engineering Technology (1949)

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Physics (1965)

Maurice Gertel
President, Kinetic Systems, Inc.
Mechanical Engineering Technology (1973)

Peter D. Gianino, B.S., M.S.
Research Physicist, Air Force Cambridge Research Labs.
Mathematics (1965)

Charles J. Glassbrenner, B.S., M.S., Ph.D.
Professor, Worcester State College.
Physics (1967)

Sheldon L. Glickler, B.S., M.S.
Avco Everett Research Laboratory, Senior Scientist.
Civil Engineering Technology (1969)

Fredrick M. Glock
Laboratory Assistant, Northeastern University.
Mechanical Engineering Technology (1969)

William B. Goggins, Jr., B.S., M.S.E.E., Ph.D.
Control Systems Engineering (1964)

David Goldberg, B.S., M.S.E.E., M.S.E.M.
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Engineering Graphics and Computation (1969)

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Electrical Engineering Technology (1969)

Ernest C. Greer, B.S.M.E., M.S.M.E.
Mechanical Engineering Technology (1970)

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Associate Professor, Electrical Engineering, Northeastern University.
Electrical Engineering (1955)

Forest W. Grumney, B.A., M.B.A.
N.E.G.E.A. Service Corp.
Mathematics 1963

*Arthur F. Gustus, B.S., M.Ed., C.A.G.S.
Assistant Director of Science, Boston Public Schools.
Course Consultant for Physics (1963)

*Francis R. Hankard, S.B., M.A.
Senior Chemist, State Police Laboratories.
Course Consultant for Physics (1946)

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Mathematics — Coordinator (1959)

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Principal Electronic Engineer, Polaroid Corp.
Electrical Engineering Technology (1962)

Harold Harutunian, A.B., M.A.T., Ed.D.
Salem State College.
Mathematics 1965

*Appointed to the rank of Senior Lecturer

Joseph I. Herzlinger, B.S., M.S., P.E. (New Jersey)
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Mechanical Engineering Technology (1967)

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 Teacher, Boston Latin School.
Mathematics (1967)

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 Vice President, Computer Dynamics, Inc.
Engineering Graphics and Computation (1966)

George K. Howe, B.S.E.E., M.Ed.
 Associate Professor Cooperative Education, Northeastern University.
Academic Counselor (1970)

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 Manager-Mechanical Engineering, L.F.E., Corp.
Mechanical Engineering Technology (1967)

*Everett L. Hume, B.S., M.S., P.E. (Mass.)
 Staff, M.I.T., Draper Laboratory.
Civil Engineering Technology (1950)

Charles E. Jacob, B.S.E.E., M.S.Ed., M.L.S.
 Master, Boston Latin School.
Physics (1967)

Perry G. Jameson, B.S., M.Ed.
 Hyde Park High School, Asst. Headmaster — Mathematics.
Mathematics (1965)

Arthur W. John, B.S.E.E., M.S.
 Lecturer, Northeastern University.
Radiologic Technology and Commercial Aviation Technology (1968)

Eugene F. Joyce
 Technician, Electrical Engineering Dept., Northeastern University, U.S. Army Retired.
Electrical Engineering Technology (1963)

John Kaczorowski, Jr., B.S.E.E., M.S.E.E.
 Instructor, Electrical Engineering, Northeastern University.
Electrical Engineering Technology (1970)

Leon Katler, Certificate P.E. (Mass., Maine, N.Y., Pa.)
 Senior Structural Engineer, Stone & Webster Engineering Corporation.
Civil Engineering Technology (1963)

Louis Katona, B.C.E., M.C.E., P.E. (Mass., N.Y.)
 Hydraulic and Sanitary Engineer, Badger Co.
Civil Engineering Technology (1959)

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 Guidance Counselor, Girls Latin School.
Physics (1958)

Sidney W. Kaye, B.Sc., M.Ed.
 Senior Engineer, Raytheon Co.
Mathematics (1967)

Gary M. Keighley, B.S.
 Director, Office of Aviation Education, Wiggins Airways.
Aviation Technology (1969)

*John T. Keiran, A.B., A.M.
 Chairman of Mathematics Department, Dorchester High School.
Mathematics (1957)

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George F. Kent, B.S., M.S., P.E. (Mass.)

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Course Consultant for Materials

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Research Physicist, Air Force Cambridge Research Lab.

Electrical Engineering Technology (1957)

Bernard J. Kiley, B.E., M.E., P.E. (N.H., Mass.)

Chief Structural Engineer, Anderson-Nichols & Company, Inc.

Mechanical Engineering Technology (1958)

Mark M. Kiley, B.E., M.E., P.E. (Mass., R.I., La., Me., Vt., N.H.)

Manager, Day and Zimmerman Associates.

Mechanical Engineering Technology (1955)

Philip D. Kingman, B.S.C.E., LL.B., P.E. (Mass., N.H.), R.L.S. (Mass., Me., N.H.)

Vice President and Counsel of Security Title and Guaranty Co.

Civil Engineering Technology (1964)

*John J. Klein, B.S., M.S.

Manager, Design Engineering, Electro-optics Section, Aerospace Systems Division,
Radio Corporation of America.

Electrical Engineering Technology (1950)

Juris Krumins, B.S., M.S.

Power Engineer, Stone & Webster Engineering Corp.

Mechanical Engineering Technology (1966)

*Horatio W. Lamson, B.S., M.A., P.E. (Mass.)

Research Engineer, Emeritus, General Radio Company.

Electrical Engineering Technology (1945)

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Manager of Employment and Training, Masoneilan International, Inc.

Engineering Graphics and Computation (1936)

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Associate Professor, Graphic Science, Northeastern University.

Program Consultant for Engineering Graphics and Computation (1955)

*Clarence E. LeBell, P.E. (Mass.)

Mechanical and Electrical Engineering Senior Designer, Aircraft Gas Turbine Division,
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Engineering Graphics and Computation (1955)

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Quincy Public Schools.

Mathematics 1965

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Consultant in Applied Mathematics and Computer Sciences.

Mathematics (1968)

See Chung Leung, B.S.

Teaching Assistant, Mechanical Engineering, Northeastern University.

Mechanical Engineering Technology (1973)

Edward T. Lewis, B.S., M.E.E., M.B.A.

Staff Member, Sperry Rand Research Center.

Physics (1967)

Sandra M. Licter, B.S.Ed., M.Ed.

Instructor, Lynn English High School.

Mathematics (1967)

*Appointed to the rank of Senior Lecturer

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President, Applied Measurements, Inc.
Course Consultant for Physics (1959)
- Kenneth L. Lincoln, B.S.C.E., M.S.C.E., P.E. (Mass.)
Senior Engineer, United Engineers and Constructors.
Civil Engineering (1972)
- Warren J. Little, B.S., M.S.
Principal Engineer, Charles Stark Draper Laboratory, Inc.
Physics (1966)
- Andrew G. Lofgren, A.A., Ed.M., P.E. (Mass.)
Design Engineer, Charles Stark Draper Laboratory, Inc.
Mechanical Engineering Technology (1946)
- *Roger G. Long, A.E., B.B.A., P.E. (Mass.)
Staff, Arthur D. Little, Inc.
Electrical Engineering Technology (1952)
- Spencer P. Lookner, B.S.E.E., M.S.E.E., M.S.I.E.
Mathematics Consultant (1967)
- *Kenneth A. Lucas, B.S., M.Ed., P.E. (Mass., Conn.), R.L.S. (Mass., Conn., Maine, N.H.)
Retired.
Civil Engineering Technology (1950)
- *George H. MacMaster, B.S., M.S., P.E. (Mass.)
Research Engineer, Raytheon Company.
Electrical Engineering Technology (1968)
- *Alvin Mandell, B.E.E., M.S.E.E., P.E. (Mass.)
Program Management, Raytheon Missile Systems Division.
Electrical Engineering Technology (1950)
- Jack I. Mann, B.S.C.E., M.S., P.E. (Mass., Conn., Pa., Vt., Wyoming)
Chief Engineer, General Engineering, United Eng. & Constr. Inc.
Mechanical Engineering Technology (1960)
- Anthony Martinez III, B.S., M.S.
Air Force Cambridge Research Laboratory.
Electrical Engineering Technology (1973)
- Anton Mavretic, B.S., M.S., Ph.D.
Staff Member, Massachusetts Institute of Technology.
Electrical Engineering Technology (1969)
- Richard F. McBrien, B.S.
Lynn English High School.
Physics (1967)
- *Edward P. McCarren, Jr., A.E.
Engineer, Bell and Howell Comm. Co.
Electrical Engineering Technology (1951)
- Carl J. Mellea, S.B., M.S., P.E. (Mass., R.I., Maine, Vt., N.H.)
Project Engineer, Howard, Needles, Tammen & Bergendorff.
Civil Engineering Technology (1960)
- Walter Messcher, B.M.E., M.S.
Engineer, Department of Transportation.
Course Consultant for Engineering Graphics and Computation (1966)
- Richard W. Miller, B.S., M.S., P.E. (Mass.)
Manager, Flow Engineering Dept., The Foxboro Co.
Mechanical Engineering Technology (1959)

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- *Ernest E. Mills, B.S., M.S., P.E. (Mass.)
Associate Professor of Mechanical Engineering, Northeastern University.
Program Consultant for Mechanical Engineering Technology
Day and Evening Programs (1947)
- David D. Moore
Teacher, Pentucket Regional High School.
Mathematics (1971)
- Louis A. Moore, A.E., B.E.T., L.S. (Mass.)
Civil Engineering Technology (1972)
- Martin C. Murphy, B.S.C.E., P.E. (Mass.)
Principal, Haley & Aldrich, Inc.
Civil Engineering Technology (1972)
- Louis J. Nardone, B.S., M.S.
Associate Professor, Electrical Engineering, Northeastern University.
Program Consultant for Electrical Engineering
Day and Evening Programs (1973)
- Robert L. Norton, A.S., B.S., M.S.
Research Associate, Tufts University.
Graphics & Computation (1967)
- *John R. O'Brien, A.B., A.M.
Head Master, Dorchester High School.
Mathematics (1946)
- John C. O'Callahan
Engineer, McPherson Associates, Inc.
Mechanical Engineering Technology (1961)
- Ray O. Oglesby, B.S.Ed., M.S.Ed.
Teacher, Weeks Junior High School.
Mathematics (1967)
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Senior Civil Engineer, The Badger Co., Inc.
Civil Engineering Technology (1970)
- Carl A. Olson, Jr., B.S., Ed.M.
Department Head, Wellesley High School.
Engineering Graphics and Computation (1964)
- *Thomas J. Owens, A.B., M.Ed.
Instructor in Mathematics, Quincy High School.
Mathematics (1952)
- Burton S. Parker, B.S., P.E. (Mass.)
Mechanical Engineer, Army Materials and Mechanics Research Center.
Mechanical Engineering Technology (1963)
- *William H. Parmenter, A.E., B.B.A.
Instructor, Newton North High School.
Electrical Engineering Technology (1952)
- Richard W. Peterson, B.S., M.S.
Radiochemist, New England Nuclear Corporation.
Physics (1968)
- Peter J. Philliou, B.S. Eng., M.S. Math, M.S. Mgt., M.S. Astronautics
Mathematics (1967)

Dominic A. Piccione, B.S., M.S.
 Engineer, Stone and Webster Co.
Mechanical Engineering Technology (1966)

*Norman C. Poirier, B.S., M.S., P.E. (Mass.)
 Research Associate, Northeastern University.
Electrical Engineering Technology (1966)

Donald J. Poulin, A.E., B.S.I.T., P.E. (Mass.)
 Associate Engineer, Western Electric Company.
Electrical Engineering Technology (1970)

Daniel W. Pratt, B.S., M.S.
 Math Dept., Boston Latin School.
Mathematics (1967)

*Charles H. Price, Jr., B.S., M.S.
 Principal Engineer, Honeywell.
Electrical Engineering Technology (1960)

William B. Pronk
 Chief Flight Instructor—Wiggins Airways.
Aviation Technology (1972)

*Sidney F. Quint, S.B., S.M., P.E. (Mass.)
 Systems Engineer, Raytheon Data Systems.
Electrical Engineering Technology (1954)

*Gerald H. Ratcliffe, A.B.
 Ratcliffe Marine Design.
Electrical Engineering Technology (1955)

Bernard C. Reddy, B.S., M.Ed.
 Teacher of Science, Blue Hills Technical High School.
Course Consultant for Physics (1965)

James F. Regan, B.S.C.E., P.E. (Mass.)
 Chief Design Engineer and Associate of Kennedy, Kennedy, Keefe, and Carney.
Civil Engineering Technology (1972)

*Edward L. Rich, B.S., M.S., P.E. (Mass.)
 Principal Engineer, Raytheon Company.
Mechanical Engineering Technology (1956)

William Richmond, B.S., Ed.M.
 Physics Instructor, Everett High School.
Mathematics (1964)

Bertram Rockower, B.S., M.S., P.E. (Mass.)
 Staff Engineer, Draper Laboratory.
Mechanical Engineering Technology (1967)

Eric A. Roy, B.A., M.Ed., M.A.
 Copley Sq. High School Instructor.
Mathematics (1967)

Thomas E. Ruden, B.S., M.S.
 President, Microwave Power Technology Company.
Physics (1967)

*Ernest J. Ryan, A.B., M.S.
 South Boston High School.
Mathematics (1959)

*Thaddeus Sadowski, S.B., Ed.M.
 North Quincy High School.
Mathematics (1958)

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Leo D. Salvucci, A.B., M.Ed., M.S.T.
Master, Boston Latin School.
Mathematics (1965)

Richard P. Samuels, B.E.E., M.S.I.M., P.E. (Mass.)
New England Tel. & Tel.
Mathematics (1970)

*Henry Schwartz, A.B., M.Ed., P.E. (Mass.)
Field Engineer, CA-PRA Inc.
Physics (1958)

Robert I. Serody, S.B.E.E., M.S.E.E., P.E. (Mass.)
Project Engineer, Raytheon Co.
Electrical Engineering Technology (1967)

Harold M. Sharaf, B.S., M.S., P.E. (Mass.)
General Manager, Titan Transformer Co.
Course Consultant for Electrical Engineering Technology (1955)

Irwin Shear, A.B., M.S.
Special Projects Manager, Raytheon Co., Equipment Div.
Engineering Graphics and Computation (1967)

Walter S. Shields, B.S., Ed.M., M.S.
Administrative Assistant to Director of Math, Needham Public Schools.
Mathematics (1966)

Bernard Sidman, B.A., M.Ed., M.A.
Mathematics Curriculum Coordinator, Beverly Public Schools.
Mathematics (1968)

Charles Siegel, A.B., M.A.
Instructor, Needham Senior High School.
Mathematics (1967)

John M. Slepetz, B.C.E., M.C.E., Ph.D., P.E. (Va.)
Mechanical Engineering Technology (1970)

Malcolm V. Smith, B.S.
New England Mutual Life Insurance Co.
Mathematics 1959

Roderic W. Sommers, B.S., M.Ed.
Associate Professor of Cooperative Education, Northeastern University.
Academic Counsellor (1969)

S. Leonard Spitz, B.S., M.S., P.E. (Mass.)
Program Manager, Raytheon Corp.
Mechanical Engineering Technology (1955)

Richard E. Sprague, B.B.A., B.S.C.E., M.B.A., Ed.M.
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Academic Counsellor (1967)

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Engineering Graphics and Computation (1966)

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R.L.S. (Mass., Conn., N.H., Me., R.I., Vt.)
Structural Engineer, Stone & Webster Engineering Corporation.
Civil Engineering Technology (1965)

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Division Manager, EG and G Inc., Electro Mechanical Div.
Electrical Engineering Technology (1960)
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Teacher, Braintree High School.
Physics (1967)
- *Raimundas Sukys, B.S., M.S.
Research Associate in Electrical Engineering, Northeastern University.
Electrical Engineering Technology (1962)
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Research Associate in Mechanical Engineering, Northeastern University.
Mechanical Engineering Technology (1969)
- Laurence R. Swain, Jr., B.S., M.S.
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Physics (1961)
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Teacher, City of Lynn.
Physics (1968)
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Editor of Wang Laboratories PROGRAMMER Magazine &
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Mathematics (1966)
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Associate Professor of Physical Science, Boston State College.
Mathematics (1956)
- *Phineas Tobe, A.B., Ed.M.
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Physics (1960)
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Mechanical Engineering Technology (1968)
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Electrical Engineering Technology (1965)
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Electrical Engineering Technology (1971)
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Project Engineer, Teradyne, Inc.
Mechanical Engineering Technology (1973)
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Engineer, Stone and Webster Co.
Engineering Graphics and Computation (1972)
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Physics (1968)
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Head of Electronics Department, Blue Hills Regional Vocation Technical High School.
Electrical Engineering Technology (1953)
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Senior Mechanical Engineer, Raytheon Company, Missile and Space Division.
Mechanical Engineering Technology (1953)

*Appointed to the rank of Senior Lecturer

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Professor of Physics, Northeastern University.
Program Consultant for Physics (1941)
- Robert M. Walters, B.S., M.S. (ME), NAV.E., MCE, Ph.D.
Lieutenant Commander, U.S.N., Naval Engineer.
Physics (1968)
- *Morton D. Weinert, A.B., Ed.M., M.Ed.
Assistant Headmaster in Charge of Mathematics, Boston Latin School.
Mathematics (1955)
- *Ralph A. Wellings, B.S., Ed.M.
Mathematics Instructor, Boston Latin School.
Mathematics (1955)
- *Ralph E. Wellings, A.B., A.M., Ed.M.
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Math (1944)
- Charles S. Whalen, B.S.M.E., M.S.M.E., P.E. (Mass.)
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Mechanical Engineering Technology (1968)
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Mathematics (1957)
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Course Consultant for Mathematics (1957)
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Civil Engineering Technology (1949)
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Staff, Massachusetts Institute of Technology, Lincoln Laboratory.
Physics (1961)
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Course Consultant for Mechanical Engineering Technology (1948)
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Associate Professor, Graphic Science, Northeastern University.
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Academic Counsellor (1967)
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Physicist, United States Army Natick Laboratory.
Physics (1973)
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Mathematics (1969)
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Mathematics (1967)

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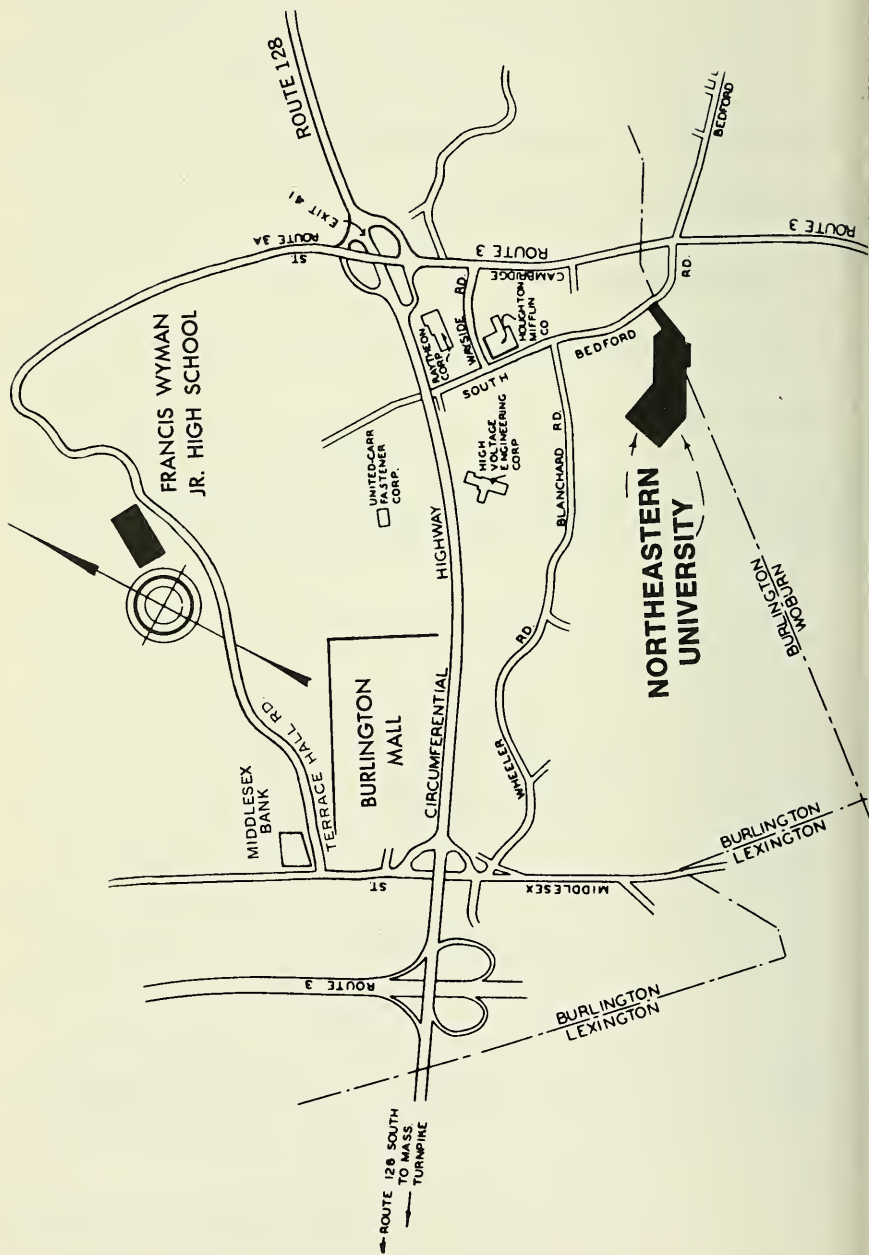
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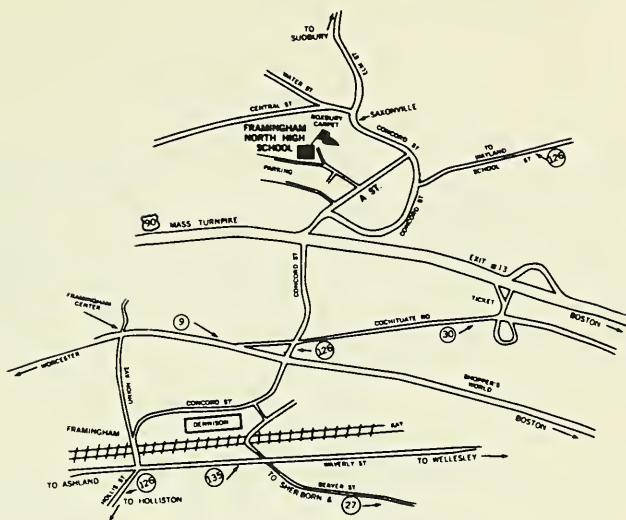
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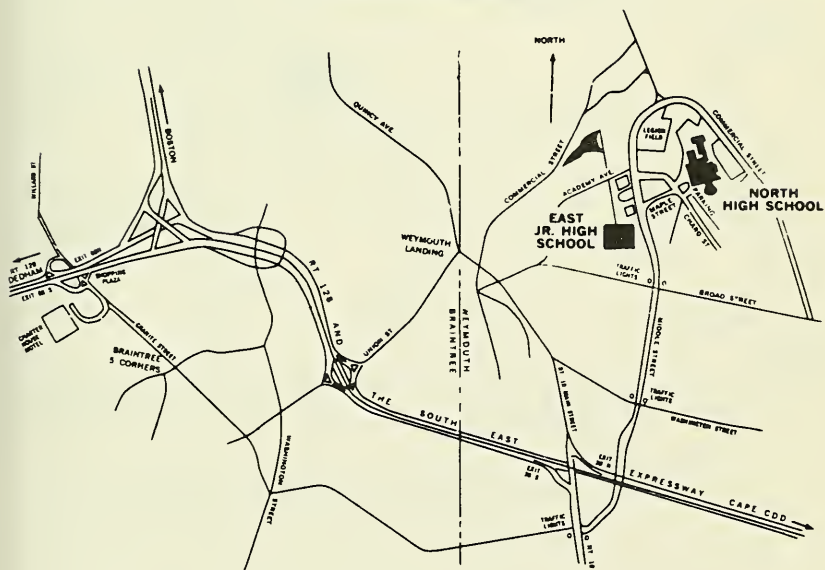
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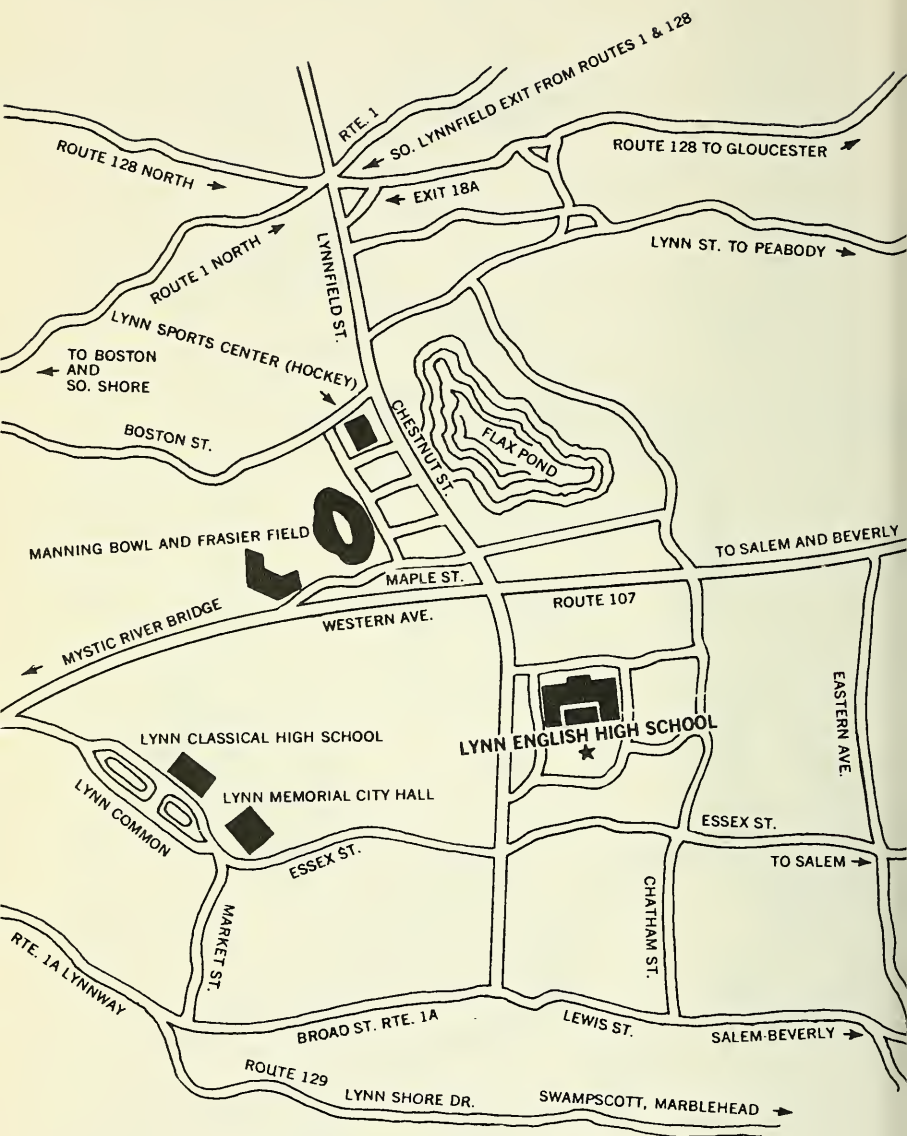
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Weymouth Schools



Lynn English High School



Norwood



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northeastern university bulletin

August Issue

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northeastern university bulletin

Part-Time Day and Evening
Undergraduate Programs in:
business administration
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law enforcement
liberal arts
education
therapeutic recreation services

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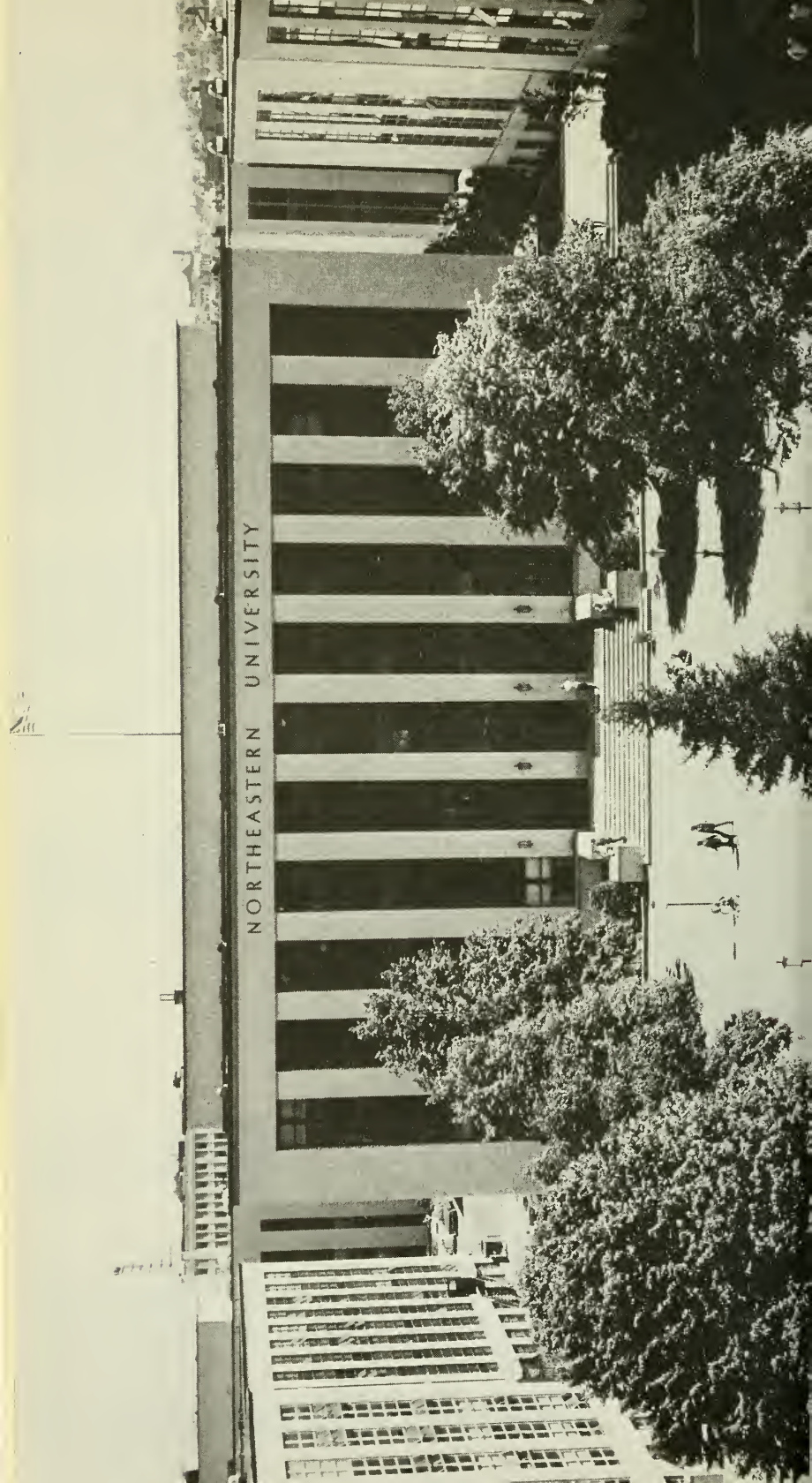


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University College 1974-75

NORTHEASTERN UNIVERSITY



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University College

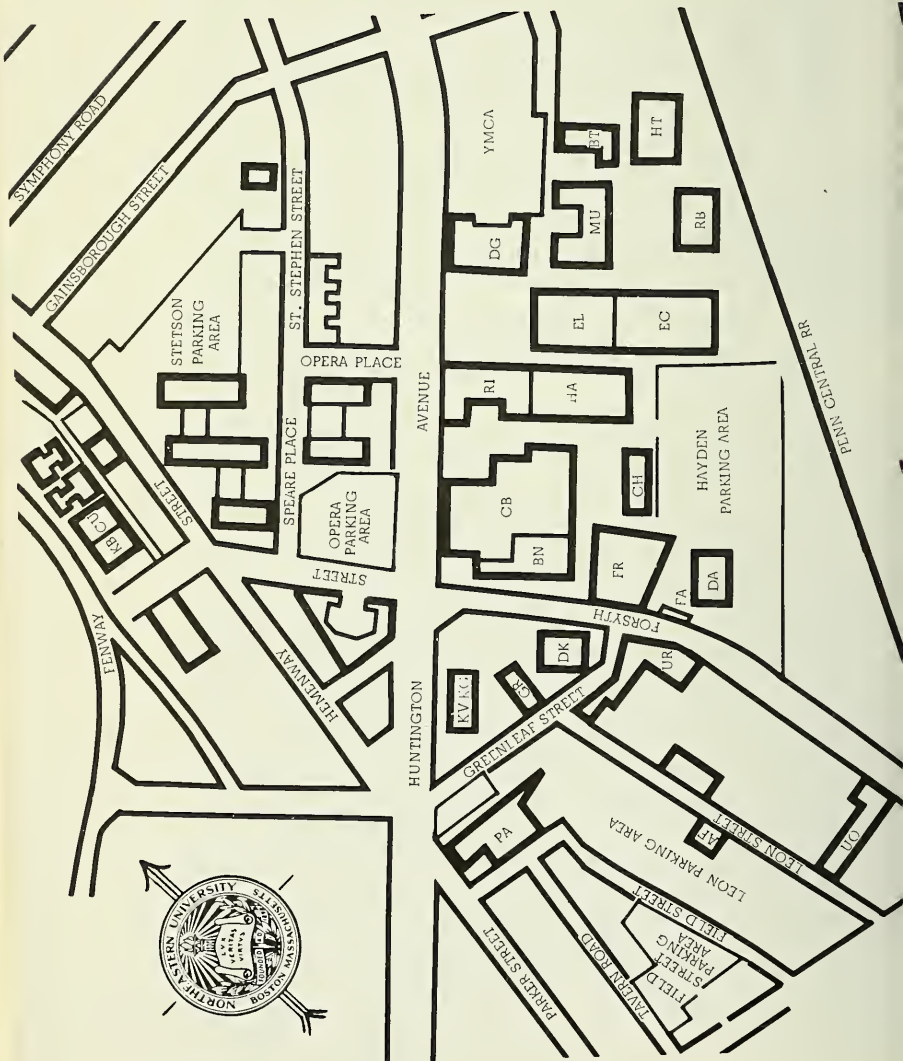
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Building Designation

BN	Barletta Natatorium
BT	Botolph Building
CB	Cabot Physical Education Ctr.
CH	Churchill Hall
CU	Cushing Hall
DA	Dana Research Center
DK	Dockser Hall
DG	Dodge Library
EC	Ell Student Center and Alumni Auditorium
EL	Forsyth Building
FR	Forsyth Building Annex
FA	Greenleaf Building
GR	Hayden Hall
HA	Hurtig Hall
HT	Kennedy Building
KB	Knowles Center (Volpe)
KV	Knowles Center (Gryzmish)
KG	11 Leon Street
UO	Afro-American Institute
AF	Mugar Life Sciences Building
MU	Parker Building
PA	Richards Hall
RI	Robinson Hall
RB	United Realty Building
UR	

MAP REFERENCE

F6
F10
E6
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G10
B6
E4
E4
J3
H3
F9
F3
E7
H9
G5



UNIVERSITY COLLEGE OFFICES

Office for General Information	102 Churchill Hall	437-2400
Office of the Registrar	120 Hayden Hall	437-2300

Regular Office Hours

Boston (120 HA & 102 CH) (102 CH)	Monday–Friday	8:30 a.m.–8:30 p.m.
	Saturday	8:30 a.m.–1:00 p.m.
Burlington	Monday–Friday	8:00 a.m.–10:00 p.m.
	Saturday	8:00 a.m.–1:00 p.m.
Framingham North High School	Monday–Thursday	5:30–9:30 p.m.
Lynn English High School	Monday & Wednesday	5:30–9:30 p.m.
Haverhill High School	Monday–Tuesday	5:30–9:30 p.m.
Norwood Junior High North	Monday–Tuesday	5:30–9:30 p.m.
Weymouth High Schools	Monday–Thursday	5:30–9:30 p.m.
Boxford (Masconomet)	Tuesday & Thursday	5:30–9:30 p.m.
Milford High School	Monday–Tuesday	5:30–9:30 p.m.

Summer Office Hours

Boston 102 Churchill Hall	Monday–Thursday	8:30 a.m.–8:30 p.m.
	Friday	8:30 a.m.–4:30 p.m.
	Saturday	Closed
120 Hayden Hall	Monday–Thursday	8:30 a.m.–8:30 p.m.
	Friday	8:30 a.m.–4:30 p.m.
	Monday–Friday	8:00 a.m.–10:00 p.m.
Burlington	Saturday	8:00 a.m.–1:00 p.m.

Program Advisers

Program advisers are available each day and evening by appointment in the University College Office. They are competent to assist the student in planning a program suitable to his general educational and career objectives. They can also answer questions relating to degree requirements, course sequence, and proper scheduling of courses. Appointments may be arranged by calling the University College Office (437-2400) or by coming in person to 102 Churchill Hall. There is no charge for this service.

Program advisers are also available during registration at all registration sites. No appointment is necessary.

Counseling and Testing Center

Counseling and testing to aid a student or prospective student with career, educational, or personal concerns are available days and certain weekday evenings until 8:30 p.m. Information regarding fees and appointments may be obtained by calling 437-2142, or by going to the Counseling and Testing Center, 302 E11 Student Center.

1974-1975 ACADEMIC CALENDAR

Fall Quarter 1974

Classes Begin Monday, September 30, 1974

FALL REGISTRATION DATES

Boston	5:30-8:30 p.m.	Monday-Friday, September 16-20
Boston	9:00 a.m.-12 noon	Saturday, September 21
Boston	5:30-8:30 p.m.	Monday-Thursday, September 23-26
Burlington	5:30-8:30 p.m.	Monday-Thursday, September 23-26
	12 noon-8:30 p.m.	Tuesday, September 17
Boxford (Masconomet Regional)	5:30-8:30 p.m.	Tuesday, September 17 and Monday, September 23
Framingham North H. S.		
Haverhill H. S.		
Lynn English H. S.		
Weymouth North H. S.		
Norwood Jr. H. S. North		
Milford H. S.	5:30-8:30 p.m.	Monday, September 16, and Monday, September 23
Classes begin		September 30
Columbus Day Observed	No Classes	Monday, October 14
Veterans Day Observed	No Classes	Monday, October 28
Thanksgiving Recess	No Classes	Thursday-Saturday, November 28-30
Final Examination Period For Fall Quarter		Monday, December 16- Saturday, December 21

Winter Quarter 1974-1975

Classes Begin Wednesday, January 6, 1975

WINTER REGISTRATION DATES

Boston	5:30-8:30 p.m.	Monday-Friday, December 16-20
Boxford (Masconomet)	5:30-8:30 p.m.	Tuesday and Thursday, December 17 and 19
Burlington	5:30-8:30 p.m.	Monday-Thursday, December 16-19
Framingham North H. S.	5:30-8:30 p.m.	Monday-Thursday, December 16-19
Haverhill H. S.	5:30-8:30 p.m.	Monday and Tuesday, December 16-17
Lynn English H. S.	5:30-8:30 p.m.	Monday and Wednesday, December 16 and 18
Milford H. S.	5:30-8:30 p.m.	Monday and Tuesday, December 16 and 17
Norwood Jr. H. S. North	5:30-8:30 p.m.	Monday and Tuesday, December 16-17
Weymouth North H. S.	5:30-8:30 p.m.	Monday-Thursday, December 16-19
Christmas Vacation	No Classes	Monday, December 23- Saturday, January 4
Winter Quarter Classes Begin		Wednesday, January 6
Washington's Birthday Observed	No Classes	Monday, February 17
Final Examination Period for Winter Quarter		Monday, March 24- Saturday, March 29

Spring Quarter 1975

Classes Begin Monday, April 7, 1975

SPRING REGISTRATION DATES

Boston	5:30-8:30 p.m.	Monday-Friday, March 24-28
Boxford (Masconomet)	5:30-8:30 p.m.	Tuesday and Thursday, March 25 and 27
Burlington	5:30-8:30 p.m.	Monday-Thursday, March 24-27
Framingham North H. S.	5:30-8:30 p.m.	Monday-Thursday, March 24-27
Haverhill H. S.	5:30-8:30 p.m.	Monday and Tuesday, March 24 and 25
Lynn English H. S.	5:30-8:30 p.m.	Monday and Wednesday, March 24 and 26
Milford H. S.	5:30-8:30 p.m.	Monday and Tuesday, March 24 and 25
Norwood Jr. H. S. North	5:30-8:30 p.m.	Monday and Tuesday, March 24 and 25
Weymouth North H. S.	5:30-8:30 p.m.	Monday-Thursday, March 24-27
Spring Recess* (Or Make Up Period for Lost Snow Days)		Monday, March 31- Saturday, April 5
Spring Quarter Begins		Monday, April 7
Patriot's Day Observed	No Classes	Monday, April 21
Memorial Day Observed	No Classes	Monday, May 26
Final Examination Period for Spring Quarter		Tuesday, June 17- Monday, June 23
Commencement		Sunday, June 22

Summer Quarter 1975

Classes Begin Monday, June 30, 1975

REGISTRATION FOR ENTIRE SUMMER QUARTER

Boston	5:30-8:30 p.m.	Monday-Friday, June 16-20
Burlington	12 noon-8:30 p.m.	Tuesday, June 17
Classes Begin		Monday, June 30
Registration for Second Six Week Term		
Boston	5:30-8:30 p.m.	Monday and Tuesday, August 4 and 5
Burlington	5:30-8:30 p.m.	Monday, August 4
Independence Day Observed	No Classes	Thursday, July 4
Labor Day Observed	No Classes	Monday, September 1
Final Examination Period for Summer Quarter		Monday, September 15- Thursday, Sept. 18

Equal Opportunity Policy

Northeastern University is committed to a policy of providing equal opportunity for all. In all matters involving admission, registration, and all official relationships with students, including evaluation of academic performance, the University insists on a policy of nondiscrimination. Northeastern University is also an equal opportunity employer; it is institutional policy that there shall not be any discrimination against any employee or applicant for employment because of race, color, religion, sex, age, or national origin.

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E. Forest Hallet, B.S., M.B.A., *Admissions Officer*
Henry R. Hilliard, Jr., A.B., *Assistant to the Dean of Adult Education*
David R. Kane, B.S., *Registrar*
Paul J. McNerney, B.S., *Assistant Registrar*
Paul D. Maxwell, B.S., M.B.A., *Assistant Dean and Director of Business Administration Programs*
Timothy F. Moran, B.S., M.Ed., *Associate Dean and Director of Law Enforcement Correctional & Security Programs*
Harold Naidus, A.B., M.S., Ph.D., *Associate Dean and Director of Liberal Arts Programs*
Helene A. Loux, Ph.D., *Associate Dean of Allied Health Professions*
Debra Snyder, B.A., *Assistant Registrar*
Kenneth C. Solano, A.B., *Associate Director of Admissions and Director of Student Activities*
Ralph T. Vernile, Jr., B.S., *Assistant Dean and Director of Administrative Services*
Marilyn S. Wiener, A.B., M.A., *Assistant Director of Liberal Arts and Coordinator of Adult Day Programs*

Committee on Academic Standing

Kenneth W. Ballou, *Chairman*

William T. Edgett, *Vice Chairman*

Sidney Herman
Helene A. Loux
Paul D. Maxwell

Timothy F. Moran
Harold Naidus
Kenneth C. Solano
Ralph T. Vernile, Jr.

Committee on Regulations & Discipline

Kenneth W. Ballou, *Chairman*

William T. Edgett
Sidney Herman
William F. King
Helene Loux
Paul D. Maxwell
Timothy F. Moran

Harold Naidus
Kenneth C. Solano
President Adult Student Council
Faculty Member
Ralph T. Vernile, Jr.

Library Committee

Marilyn S. Wiener, *Chairwoman*

Kenneth W. Ballou (ex-officio)
Harold Naidus
Timothy F. Moran

Marvin Lesser
William Kidney
Two Students

Business Administration Curriculum Committee

Paul D. Maxwell, *Chairman*

Kenneth W. Ballou (ex-officio)	Thomas J. McNamara
Sidney Herman	Joel M. Rosenfeld
James W. Earley	Three Students
Robert J. Hehre	

Law Enforcement Curriculum Committee

Timothy O. Moran, *Chairman*

Kenneth W. Ballou (ex-officio)	Three Faculty Members
Joseph Connors	Norman Rosenblatt
Robert Croatti	Three Students
Sidney Herman	

Liberal Arts Curriculum Committee

Harold Naidus, *Chairman*

Kenneth W. Ballou (ex-officio)	Lila Leibowitz
Fletcher Boig	Marvin X. Lesser
Francis D. Crisley	Roland L. Nadeau
Ernest DeCicco	Raymond H. Robinson
Sidney Herman	Three Part-Time Faculty Members
Charles Karis	Three Students
Walter Jones	Robert L. Wells

Health Professions Curriculum Committee

Helene A. Loux, *Chairman*

Kenneth W. Ballou (ex-officio)	Britta Karlsson
Constance Bean	Robert Lovejoy
Annalee Collins	Sydney McNeil
Paul Cowan	Harold Naidus
Sidney Herman	Matthew Stevens
Louise Hord	Two Students



the university

Founded in 1898, Northeastern University is incorporated as a privately endowed nonsectarian institution of higher learning under the General Laws of Massachusetts. By special enactment, the State Legislature has given the University general degree-granting powers. The University is governed by a Board of Trustees elected by and from the Northeastern University Corporation, which comprises more than 178 distinguished business and professional men and women.

From its beginning Northeastern University's dominant purpose has been to identify community educational needs and to meet these in distinctive and serviceable ways. The University has not duplicated the programs of other institutions, but has pioneered new areas of educational service.

A distinctive feature of Northeastern University is its Cooperative Plan, under which students alternate periods of work and study. The Plan was initiated by the College of Engineering in 1909 and subsequently adopted by the Colleges of Business Administration (1922); Liberal Arts (1935); Education (1953); Pharmacy (1962); Nursing (1964); Boston-Bouvé College (1964); the College of Criminal Justice (1967); and by Lincoln College's daytime Bachelor of Engineering Technology program (1971).

This time-tested method of education offers students the opportunity to gain valuable practical experience as an integral part of their college programs and also enables them to contribute substantially to the financing of their education. The "Co-op" Plan has been extended to the graduate level in engineering, actuarial science, professional accounting, business administration, rehabilitation administration, and law.

In the field of adult education, Northeastern University offers graduate and undergraduate degree programs and non-credit programs which are specifically designed to meet the needs and interests of adults who wish to further their education on a part-time basis.

All formal courses of study leading to degrees in the Graduate Division, Lincoln College, and University College are approved by the undergraduate faculties concerned, and are governed by the same qualitative and quantitative standards as the regular day curricula. Courses are scheduled in the day and evening at the Boston Campus, Suburban Campus in Burlington, and at other off-campus locations near Boston.

UNDERGRADUATE COLLEGES

Boston-Bouvé College

Boston-Bouvé College offers four major programs of study: physical education, recreation education, and health education, leading to the degree of Bachelor of Science in Education; and physical therapy, leading to the degree of Bachelor of Science in Physical Therapy.

The combined programs of liberal arts, science, and professional preparation include field experience and student teaching as well as leadership training in camping and outdoor education at the Warren Center for Physical Education and Recreation in Ashland. In accordance with Northeastern's Cooperative Plan of Education, students are offered varied opportunities for alternate terms of work-study experience during upper-class years.

College of Business Administration

The College of Business Administration offers programs of study in the principal fields of business leading to the Bachelor of Science degree in Business Administration. These programs are offered on the five-year Cooperative Plan, under which students gain substantial practical experience as an integral part of their undergraduate course of study.

The College also sponsors a Center for Management Development, which annually conducts an intensive program designed to provide professional growth for middle management executives. The plan of instruction, based on a modification of the Northeastern Cooperative Program, permits the participants to maintain their job responsibilities during the six-month period of the course. The Management Development Program is conducted at Andover, Massachusetts, on the campus of Andover Academy.

The Bureau of Business and Economic Research, concerned particularly with problems of the New England region, is an integral part of the College. The Bureau conducts research projects under faculty leadership using undergraduate cooperative students as research assistants.

College of Criminal Justice

The College of Criminal Justice offers a full-time day curricula on the Cooperative Plan leading to the degree of Bachelor of Science.

College of Education

The College of Education offers programs leading to the degree of Bachelor of Science in Education. These are designed to prepare students for teaching or administrative positions in elementary and secondary schools. Curricula are offered on the five-year Cooperative Plan, which provides employment in libraries, social service agencies, and school systems.

College of Engineering

The College of Engineering offers five-year cooperative curricula in civil, mechanical, electrical, chemical, and industrial engineering leading to the degree of Bachelor of Science with specification according to the engineering department in which the student qualifies, and a more general program without specification leading to the Bachelor of Science degree. A six-year program in power systems engineering in collaboration with public utilities leads to both the bachelor's and master's degree in electrical engineering. The College also offers during evening hours part-time programs leading to Bachelor of Science degrees in Civil and Electrical Engineering. These programs extend over eight years, cover the identical courses given in the day cooperative curricula, and meet the same qualitative and quantitative standards of scholarship.

College of Liberal Arts

The College of Liberal Arts offers majors in the arts and sciences leading to the Bachelor of Arts or Bachelor of Science degrees. With the exceptions of preprofessional programs, curricula are normally five years in length and operate on the Cooperative Plan.

Lincoln College

Lincoln College offers engineering technology programs leading to the degrees of Associate in Engineering, Associate in Science, and Bachelor of Engineering Technology. These programs are made available as:

- (a) A full-time day curricula on the Cooperative Plan leading to the degree of Bachelor of Engineering Technology (B.E.T.) in Mechanical and Electrical Engineering.
- (b) A part-time evening program including pre-technology preparatory courses and degree programs leading to the Associate in Engineering (A.E.); and the Bachelor of Engineering Technology (B.E.T.) in Civil, Mechanical, and Electrical Engineering. The Associate in Science degree may be earned in the mathematical, physical, and chemical sciences.

The day B.E.T. program is designed to meet the needs of the high school graduate or the student transferring from a community college or technical institute and who desires the full time day curricula on the Northeastern Cooperative Plan.

In addition to its traditional curricula, Lincoln College Evening School offers interdisciplinary and certificate programs providing technological and professional development opportunities to meet special needs of the part-time student. These programs are designed to provide trained people for ready assimilation by the engineering field and to prepare students for the challenge of interfacing technology and society.

Recognizing the increasing need for higher levels of technical efficiency in firefighters, Lincoln College, in collaboration with local firefighting agencies, has designed a part-time evening program leading to an Associate in Science degree in Fire Technology. The curriculum includes a broad spectrum of those science technologies which are basic in coping with the firefighting problems attendant to the complexities of today's society.

College of Nursing

The College of Nursing offers two separate and distinct programs of study, both organized on the Cooperative Plan:

- (a) A three-year curriculum in preparation for the R.N. Examinations, and leading to the Associate in Science degree.
- (b) A five-year curriculum in preparation for the R.N. Examinations, and leading to the Bachelor of Science degree in Nursing.

Five of Boston's leading hospitals—Beth Israel, Children's Hospital Medical Center, New England Deaconess, Peter Bent Brigham, and Massachusetts General—collaborate with Northeastern by providing suitable cooperative work opportunities during the students' upper-class years in these programs.

College of Pharmacy and Allied Health Professions

The College of Pharmacy and Allied Health Professions offers five-year cooperative curricula leading to the degree of Bachelor of Science in Pharmacy, and to the Bachelor of Science degree with majors in medical laboratory science (medical technology, cytotechnology, and hematology) medical record administration, and management in health care agencies and institutions. Associate degree programs are offered in medical laboratory science, respiratory therapy, dental hygiene, and cytotechnology. The College has academic responsibility and, in cooperation with the medical schools and teaching hospitals in the Boston area, offers the professional program for physician assistants.

University College

University College, so called because it draws upon the resources of the other colleges of the University, offers part-time day and evening programs in liberal arts, business administration, law enforcement, education, health professions, and therapeutic recreation service programs, leading to the Associate in Science, Bachelor of Arts, and Bachelor of Science degrees. It does not duplicate the offerings of the day colleges, but provides curricula which cut across traditional subject-matter areas to meet the particular needs of adult students. Students may pursue a degree or simply take courses, based on needs and interests, up to a total of forty quarter hours of credit. Courses are offered in Boston as well as in Boxford, Burlington, Framingham, Lynn, Haverhill, Milford, Weymouth, and several other convenient locations.

Adult Day Programs refers to University College courses that are offered Monday through Friday, 9:00 a.m. to 5:00 p.m., to meet the needs of adults with family or other obligations who wish to engage in part-time study during the day. In addition to the daytime offering of regular University College credit courses, Adult Day Programs also offers daytime workshops and conferences, sometimes over weekends, with the option for credit. Adult Day Programs are offered primarily on the Boston and Burlington campuses, with a limited number of courses offered at other off-campus locations.

Students may enroll as degree candidates or elect single courses appropriate to their needs and interests. Courses are scheduled in the day and evening at the Boston Campus, Suburban Campus in Burlington, and other off-campus locations near Boston.

GRADUATE SCHOOLS

Actuarial Science

Master of Science in Actuarial Science.

Arts and Sciences

The Master of Arts degree may be earned in economics, English, history, political science, psychology, sociology, and social anthropology. The Master of Science degree is available in biology, chemistry, mathematics, and physics. The Master of Science in Health Science and the Master of Public Administration degrees are also offered. In addition, there are programs leading to the Doctor of Philosophy Degree in biology, chemistry, economics, mathematics, physics, psychology, and sociology.

Boston-Bouvé College

Master of Science in Physical Education and Master of Science in Recreation education.

Business Administration

Master of Business Administration.

Criminal Justice

Master of Science in Criminal Justice

Education

Master of Education, and the Certificate of Advanced Graduate Study.

Engineering

Master of Science with course specification, including a special six-year program in Power Systems Engineering leading to both bachelor's and master's degrees in Electrical Engineering; a similar six-year program in Mechanical Engineering leading to both bachelor's and master's degrees; the Master of Science degree in Civil Engineering; master's degrees in the fields of Industrial Engineering and Engineering Management; the professional Engineer degree in Electrical Engineering; the Ph.D. in the fields of Electrical, Chemical, Civil, and Mechanical Engineering; and Doctor of Engineering degree in Chemical Engineering. In addition, the intermediate degree of Engineer is offered.

Law

The School of Law offers a full-time program of professional instruction leading to the degree of Juris Doctor (J.D.) The three-year curriculum includes twelve months of experience in law offices. There are no courses for part-time or evening students.

Pharmacy and Allied Health Professions

Master of Science with specialization in Hospital Pharmacy, Industrial Pharmacy, Medicinal Chemistry, Pharmacology, Medical Laboratory Science, and Doctor of Philosophy in Medicinal Chemistry.

Professional Accounting

A five-quarter curriculum leading to the degree of Master of Science in Accounting.

INSURANCE INSTITUTE

The Insurance Institute, which is sponsored by local insurance organizations and companies, has recently joined University College. It offers a number of non-credit courses in preparation for the Chartered Life Underwriter and Chartered Property-Casualty Underwriter Designations as well as for the General Insurance, Insurance Adjuster, and Risk Management Certificates. (437-2506).

CENTER FOR CONTINUING EDUCATION

The Center for Continuing Education was established to relate the University to the needs of its community in a period of accelerated change. Its programs are composed of seminars, conferences, institutes, forums, and a wide variety of special courses designed to serve specific needs. The Division of Special Programs, working cooperatively with trade associations and professional societies, offers several programs dealing with current needs and problems. Through its Division of Community Services, working with governmental agencies and community organizations, the Center is becoming increasingly involved in social problems on both the local and national level.

Many of these programs are conducted at Henderson House, Northeastern University's conference center in Boston, Massachusetts.

RESEARCH ACTIVITIES

The faculties of the University are engaged in a wide variety of basic research projects in business, science, social science, pharmacy, and engineering. These are coordinated by the Dean of Research, whose services are University-wide and available to the faculties of all the Colleges.

Although Northeastern is primarily concerned with undergraduate and graduate instruction, the University believes that the most effective teaching and learning takes place in an environment characterized by research activities directed toward extending the frontiers of knowledge.

buildings and facilities

The main campus of Northeastern University is located at 360 Huntington Avenue in the Back Bay section of Boston. Many of the city's famous cultural, educational, and philanthropic institutions are situated in the Back Bay, including the Museum of Fine Arts, Symphony Hall, Horticultural Hall, the Isabella Stewart Gardner Museum, the Harvard teaching hospitals, and many schools and colleges. Most are within walking distance of Northeastern University.

Major transportation facilities serving the Boston area are Logan International Airport, two rail terminals, bus terminals serving inter- and intrastate lines, and MBTA subway-bus service within the metropolitan-suburban area. There is a subway stop in front of the campus. For motorists, the best routes to the campus are the Massachusetts Turnpike (Exit 22) and Route 9, of which Huntington Avenue is the intown section.

The campus of 47 acres is divided by Huntington Avenue, with the main educational buildings on one side and dormitories on the other. The principal buildings, all of which have been constructed since 1938, are of glazed brick in contemporary classic style. Most are interconnected by underground passageways.

Carl S. Eli Student Center

The Carl S. Eli Student Center provides facilities for student recreation and for extracurricular activities. The Alumni Auditorium, with a seating capacity of 1,300, is part of the Center. Also included are special drama facilities, a ballroom, main lounge, fine arts exhibition area, student offices, conference rooms, and a dining area seating more than 1,000.

The University Library

The Dodge Library is the main library on the Boston campus and maintains an open-stack system. Bound volumes in the library system exceed 360,000, and microfilm titles, 267,000. Collections are located in these areas:

1. The General Collection in the book stacks as indicated by the classification number given in the upper left corner of the catalog card.
2. The Reference Collection in the Cabot Reading Room to the left of the Circulation Desk, which includes bibliographies, maps, company publications, the pamphlet file, and association publications. Theses, under the supervision of the Reference Dept., housed in the basement, and available on request in the Reference Room.
3. The Periodical Collection in the Webster Reading Room to the right of the circulation desk, consisting of current periodicals, periodical indexes, and abstracts, with two adjacent stack levels for back files of

bound volumes. The Microfilm Collection in room 108, adjacent to the Webster Reading Room.

4. The Reserve Book Collection on the second floor.
5. The Foreign Literature Collections in the Webster Reading Room to the right of the Circulation Desk.
6. The Collections of Fine Arts, housed in the Richardson Room on the second floor. The Audio Facility for spoken and music recordings and magnetic tapes for instructional and individual use also located in this room.
7. The American and English Literature Collections in the Literature Reading Room.
8. Government Documents maintained on the basement level.

The Card Catalog is a union list of materials in the University libraries and is located in the Webster Reading Room. There are also book catalogs of the collections in the Math/Psych Library, Chemistry Building Library, Documents and Reserve Rooms. There is an Information Desk in this room to assist people in using the card catalog during the day.

The Circulation Dept. has a printed list of all materials charged out, which may be consulted by all users. To borrow materials, University identification must be presented. For extensive research, where the University Library does not have the material, application should be made to the Inter-Library Loan Librarian for materials needed from other libraries. Information service is available in this department in the evenings.

Library Hours — Boston Campus

Monday — Thursday	7:45 a.m. to 10:00 p.m.
Friday	7:45 a.m. to 7:30 p.m.
Saturday & Sunday	1:00 p.m. to 5:00 p.m.

The University Library System includes three graduate libraries in the Division of Research. Physics-Electrical Engineering is housed in 325 Dana Research Center. Mathematics-Psychology is housed on the fifth floor of the United Realty Building and Chemistry is located on the first floor of Hurtig Hall.

Library Hours — Suburban Campus, Burlington

Monday — Friday	8:30 a.m. to 9:00 p.m.
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Cabot Physical Education Center

The Godfrey Lowell Cabot Physical Education Center is one of the best equipped in New England. It contains four basketball courts, an athletic cage, a women's gymnasium, and a rifle range, as well as administrative

offices for the Department of Athletics and for the Physical Education Department of Boston-Bouvé College.

A recent addition to the center, the Barletta Natatorium, houses a 105-foot swimming pool, a practice tank for the crew, handball courts, and shower and dressing facilities.

Dockser Hall

Charles and Estelle Dockser Hall, completed in 1968, houses a large gymnasium, dance studio, motor performance laboratory, college library, community recreation laboratory, folk arts center, dark and music rooms, recreation resources area, locker rooms, offices, classrooms, conference room and lounge, storage facilities, and a research laboratory.

Suburban Campus

The Suburban Campus, located near the junction of Routes 128 and 3 in Burlington, Massachusetts, was established to meet the needs of individuals and of industry in the area.

In addition to graduate courses in engineering, physics, mathematics, business administration, science, education, and the arts, portions of undergraduate programs leading to the associate and bachelor's degrees, special programs for adults, and non-credit state-of-the-art programs are offered.

Henderson House

The University's conference center, Henderson House, is located in Weston, Massachusetts. The Center for Continuing Education conducts short-term courses, seminars, and special institutes for business, professional, and research groups. Henderson House is 12 miles from the main campus.

Warren Center

The Warren Center for Physical Education and Recreation in Ashland, Massachusetts, serves as a year-round outdoor laboratory for students in Boston-Bouvé College. There are facilities for conferences, special education in arts and crafts, and sports—including aquatics. Buildings include a lodge, cottages, and an infirmary.

Marine Science Institute

The Marine Science Institute at Nahant, Massachusetts, about 20 miles northeast of Boston, is a research and instructional facility primarily engaged in studies of marine biology and oceanography. The Institute is operated the year around.

Brockton, Nashua, and Framingham Campuses

For students residing in southeastern Massachusetts and northeastern Rhode Island, the Graduate School of Business Administration offers a major portion of its M.B.A. Program at facilities in Brockton, Massachusetts. These facilities, made available by the Veterans Administration Hospital, are conveniently located just off Route 24.

Students residing in the southern New Hampshire area may take a major portion of the M.B.A. Program at facilities in Nashua, New Hampshire. These facilities are furnished by Sanders Associates, Inc. and are located in their headquarters on Route 3, just over the Massachusetts line.

For students in the Framingham-Worcester area, a major portion of the M.B.A. Program may be taken at classroom facilities located in Framingham, Massachusetts.

university college

The Programs

University College is committed to the education of mature, adult students who wish to live effectively in today's complex society. The programs in University College are specifically designed to satisfy the changing professional, cultural, and social needs and interests of adults.

Degree programs have been developed in 39 major fields of study in the areas of business administration, education, liberal arts, law enforcement, and health-related programs. Flexible curricula are offered on a part-time basis Monday through Saturday during day and evening hours convenient to adult students. Students may elect single courses or may enroll in full degree programs leading to the Associate in Science or the Bachelor of Science degree. Short-term seminars are also offered for credit. Classes are scheduled in locations which are accessible to the urban and the suburban community. Students may attend classes at the Huntington Avenue Campus, Boston, or the Suburban Campus, Burlington, Massachusetts, as well as other off-campus locations north, south, and west of Boston.

University College programs are constantly evaluated and redesigned when necessary in order to keep pace with the changing needs and interests of its students and the community.

The Faculty

Approximately 800 men and women comprise the part-time teaching staff of University College. Included are members of the full-time faculty of the Basic Colleges of Northeastern University and other educational institutions in New England, as well as outstanding New England business and professional leaders with backgrounds of training and experience in specialized areas. The faculty are selected because they are highly successful in their fields and are well qualified to provide sound methods of teaching for adults in an interesting, inspiring, and effective manner.

The Student Body

The student body of University College represents diversified interests which properly recognized and utilized become one of the basic strengths in adult education. There are approximately 12,000 students in University College who range in age from 18 years to beyond retirement. While some

students enroll in University College immediately after high school graduation, others may have graduated 25 years prior to enrollment in college-level courses.

University College students are men and women who have full-time commitments to their jobs, families, or other responsibilities. They may enroll in a single course or in a full degree curriculum, depending on whether their goal is job advancement, a new career, or personal enrichment.

academic policies

Admission

All applicants who satisfy the requirements as regular or special students are admitted as part-time students in University College. It is advisable for students to have an interview with an admissions counselor to help plan their academic program in University College, particularly in cases where previous credit has been completed at other institutions, in order to avoid possible duplication of courses. Because of the diversity of the student body in terms of background, age, interests, needs, etc., there are no entrance examinations and college board examination scores are not required. In lieu of entrance examinations, students must maintain a C average in order to be admitted to degree candidacy.

Regular Students

To be enrolled as a regular student, that is, to become a degree candidate, the applicant must have completed an approved secondary school course or the equivalent 15 units* of a high school diploma. Equivalency certificates are accepted. Regular students are those students who expect to follow a degree program.

Special Students

Special students are those students who do not wish to enroll in a full degree program, but are interested in taking only one or more courses appropriate to their needs or interests. Credits for these courses may be transferred to a degree program if the student desires to pursue a degree at a later time.

Foreign Students

Only those University College students who have matriculated as degree candidates and are attending as full-time students are eligible for an 1-20 Certificate of Eligibility for a student visa.

Information concerning foreign students should be requested from the Office of International Student Affairs, 205 Ell Building. Office hours: 8:30 a.m. to 4:30 p.m., Monday through Friday.

Procedure for Admission As a Degree Candidate: Matriculation

Petition forms for admission to the status of a degree candidate are available at offices on all University College Campuses. There are two methods of matriculation:

*A unit represents a year's work in any subject in any approved secondary school constituting approximately a quarter of a full year's work, or the equivalent. A four-year day high school course is regarded as representing at least 15 units of work, or 3 units in junior high school and 12 units in a three-year high school.

A. Standard Method of Matriculation

1. If a student has completed 40 quarter hours of credit in University College, he cannot register for additional courses unless he has been officially accepted as a degree candidate.
2. In order to matriculate as a degree candidate, the student must have a high school diploma or its equivalent and must achieve a cumulative quality point average of 2.00 (an average grade of C) for all courses completed before filing the petition. In the Liberal Arts Program, the 8 quarter hours of required English must be completed prior to matriculation.

B. Optional Method of Matriculation by Transfer Students.

1. If a student has successfully completed an associate degree program at another accredited institution, he may file for matriculation following one quarter in residence in University College.
2. If a student has completed 40 quarter hours at another accredited institution, he may file for matriculation following one quarter in residence in University College.
3. If a student has completed 40 quarter hours of combined credit from another accredited institution and University College, he may file for matriculation.

All students who file for matriculation must have a high school diploma or its equivalent, a cumulative quality point average of 2.00, and, if in the Liberal Arts Program, 8 quarter hours of required English.

A student who matriculates via Method B, is required to obtain written permission from his Program Director before taking courses in another institution subsequent to matriculation in University College.

The Committee on Academic Standing may require a student to take one or more aptitude or interest tests if his credentials or academic record fail to give evidence of probable academic success. In this case, the student will be notified in writing that arrangements for testing should be made by him with the University Counseling and Testing Center. A fee is charged for administering these tests.

Advanced Standing Credit

After completion of matriculation requirements in University College (40 quarter hours in residence) Advanced Standing Credit may be obtained in two ways:

By Transfer of Credit from Another Institution

Subject to approval by the Director of Admissions, credit may be granted for work completed in other approved schools, colleges, or universities. An applicant who wishes to receive credit by transfer should petition for transfer credit with the Director of Admissions. He should then write to the Registrar of the institution previously attended and request that an official

transcript be sent to the Director of Admissions in University College. The transcript indicates honorable dismissal, courses completed, credits and grades received. The transcript should be sent well in advance of the registration period, and after filing the petition for transfer credit, the applicant should inform the Director of Admissions of his major field of interest so that the transcript will be evaluated appropriately.

Students who anticipate taking courses at other Colleges or Universities while enrolled in University College must secure permission in advance from the appropriate program director in University College.

Students who have been dismissed from another institution for academic reasons must accompany their application with a statement from the dean or other appropriate official of their previous institution setting forth the reasons for dismissal or probationary status with recommendation for continued study. All applicants will be considered on their own merits.

By Examination

Credit is granted for successful completion of appropriate examinations in the College Level Examination Program (CLEP). Credit may be disallowed for work previously completed because of the remoteness of the time of study; however, these applicants may take CLEP Examinations where appropriate. Credit is also granted for non-collegiate experience in both the Liberal Arts and Law Enforcement Programs. See pages 80, and 102.

In all cases students admitted by transfer or advanced standing credit from any other institution must meet the requirements for matriculated status as set forth under the regulations applicable to regular students.

Residence Requirement

Every candidate for the baccalaureate or associate degree must fulfill the residence requirement. The residence requirement is defined as the satisfactory completion in University College immediately preceding graduation of 46 consecutive quarter hours of work in course, with the further provision that at least 12 of the 46 quarter hours must be in the candidate's major field. All programs to meet the residency requirement must have the approval of the Dean. Students whose attendance in degree programs is interrupted for a period of one year or more will be reinstated into the program in effect at the time of their re-entry into University College.

In the case of students who for causes beyond their control move outside of the reasonable commuting area of the College, and who have completed 134 or more quarter hours of credit in course, the Committee on Education will entertain a petition to allow them the privilege of completing their degree requirements at some other approved college. Under no circumstances will a degree be awarded to any student who has completed less than 46 quarter hours of credit in courses in University College.

Quality Requirement for Graduation

A cumulative quality point average of 2.00 (an average grade of C) is required for graduation. Advanced standing credits are not averaged in the cumulative score.

Graduation with Honor

Candidates who have achieved distinctly superior attainment in their academic work will be graduated with honor. Upon special vote of the faculty a limited number of this group may be graduated with high honor or with highest honor. To be considered for graduation with honor, a student must have completed a minimum of 72 quarter hours of work at University College. Courses credited by advanced standing will be eliminated in determining honor graduates.

Attendance at Commencement

Attendance at commencement for all University College degree candidates is optional. Degree candidates will be polled by the commencement committee in this regard during the Spring Quarter.

A petition to receive a degree *in absentia* must be presented to the Dean. Each petition will be acted upon by the Dean.

Quality Points

The requirement for graduation from University College is 174 quarter hours with attainment of a quality point average of 2.00. Although the credits allowed for acceptable work completed elsewhere by transfer students count toward fulfillment of quantitative graduation requirements, neither the credits nor the grades earned in such courses are included in quality point computations for graduation.

The method of figuring quality points is as follows: Each quarter hour credit of A grade is multiplied by 4, B grade by 3, C grade by 2, D grade by 1, and F grade by 0. The total number of quality points, divided by the total number of quarter hour credits completed, shall be the quality point average.

Students receiving an F grade in a required course must repeat the course in its entirety including term work, examinations, and attendance.

Quality Point Averages

The Registrar's Office will not be able to recalculate or confirm the calculations of quality point averages for individual students. Each student's record will be brought up to date before his graduation. In the meantime, borderline cases will be checked by the Director of Admissions of University College.

Dean's List

All matriculated students who have taken a minimum of 18 quarter hours in three consecutive quarters (Fall, Winter, Spring) of an academic year and

have completed all their courses with an average of 3.0 or better shall be placed on the Dean's List. Each student shall receive a letter of commendation from the Dean of University College.

Pass-Fail Courses

Any student who is not on academic probation and who has completed 40 Q.H. of academic work may register for one pass/fail course and, thereafter, for one course on a pass/fail basis for each 10 Q.H. of successfully completed work. Written permission of the appropriate academic dean must be obtained for each pass/fail course. At no time may a student register for more than one pass/fail course per quarter.

Such courses will be restricted to free electives outside the major field of specialization, so that no part of the specifically prescribed curricula will be affected.

The grades recorded on the basis of the pass/fail system of grading will not figure in the computation of the QPA.

Satisfactory completion of the work in all courses taken on the pass/fail system of grading will be designated on the transcript by the letter "S." Unsatisfactory work will be designated on the transcript by the letter "U." Any unsatisfactory grade must be handled according to the existing policy of the University, but must never be cleared through the election of the same course on the basis of the pass/fail system of grading.

An incomplete in a course taken on a pass/fail basis will be designated by the letter "X" on the transcript and must be treated according to the normal procedure for incomplete grades.

The following REGISTRATION PROCEDURES shall prevail:

Students wishing to use the pass/fail system of grading for a course must meet all prerequisites for such course and should signify their desire to apply for a specific course on the basis of this system of registration.

The student's decision to take a course on a pass/fail basis must be made prior to the second meeting of the course and no changes will be permitted thereafter.

Class Changes

University College reserves the right to cancel, split, or combine classes when necessary.

Registration

Before attending classes, students must report to the registration area to register. All students must complete their registration properly before attending class. Attendance at class, even with the instructor's permission, does not constitute registration.

No academic credit will be recorded for students not properly registered.

In order to insure academic success, students are strongly advised to adhere to course prerequisites.

Class Attendance and Preparation

Students are expected to attend all exercises in the subjects they are studying unless excused in advance.

Absence from regularly scheduled exercises in any subject will seriously affect the standing of the student. Consecutive absences may cause the removal of the subject or subjects from the student's schedule.

Two hours of preparation are normally required for each hour spent in the classroom.

Withdrawal Policy

A student may be withdrawn from a course in several ways:

VOLUNTARY WITHDRAWAL—The student completes a drop course form in the Registrar's Office or notifies the Registrar in writing of his intention to withdraw from the course.

INITIAL ABSENCE WITHDRAWAL—If a student is absent without permission from the first three meetings of a course, he will be withdrawn by the Registrar.

END OF COURSE WITHDRAWAL—If, by the ninth or tenth week of the quarter, the Registrar, after examining the attendance book, has every reason to believe the student has dropped from the course, he will officially withdraw the student and so note in the attendance book.

Change of Address

Change of address and/or name should be reported immediately to the Registrar's Office.

Absence Because of Illness

All students who are absent from school because of extended illness, and do not wish to be withdrawn, should inform the Registrar's Office by letter.

Examinations

Term tests are scheduled in each quarter at the option of the instructor and are regarded as part of the term's course work. A final examination will be held at the end of each quarter in each course unless an announcement to the contrary is made.

Homework Assignments

Students are responsible for obtaining their homework assignments by contacting their instructor or another student in their class. Homework assignments are not available in the University College Office.

Missed Final Examinations

A student does not automatically have the right to make up a missed final examination. Students must petition for this privilege and must pay a fee of \$5.00 for each special examination when filing for the special make-up exam. All students who wish to clear an I (incomplete) grade must pay the fee and file the proper petition in the Registrar's Office, 120-HA, or in each off-campus administrative office. Petitions for missed finals must be filed in accordance with the schedule listed below:

final examination missed during:	file petition no later than:	make-up final exam during week of:
Fall Quarter 1974	January 24, 1975	February 17, 1975
Winter Quarter 1975	April 25, 1975	May 19, 1975
Spring Quarter 1975	July 8, 1975	August 11, 1975
Summer Quarter 1975	October 10, 1975	November 3, 1975

Students will be notified by mail when and where to take the missed final examination. All examinations will be administered on the Boston Campus.

Students who do not take make-up final examinations as scheduled (see below for I grade explanation) and clear an incomplete through the instructor, will be billed the \$5.00 make-up exam fee by the Bursar before the I grade is changed.

Grading System

The following system of grading is used. The numerical equivalent for each grade is in parentheses.

A (4.0) — Outstanding	L — Audit (No Credit)-UC and LC only
B (3.0) — Good	S — Satisfactory (Pass-Fail Grade)
C (2.0) — Satisfactory	U — Unsatisfactory (Pass-Fail Grade)
D (1.0) — Poor	X — Incomplete (Pass-Fail Grade)
F (0.0) — Failure	* — Grade not received
I (—) — Incomplete	

A general average of "D" is unacceptable and will not allow a student to continue in University College or to receive a degree from Northeastern University. The "F" grade is a definite failure and requires repetition of course in its entirety. The "I" grade is given only when the student fails to take the final examination.

The I Grade

The I grade may be given only when the student fails to take the final examination.

An instructor may decide that a student has done so poorly in the course that even a perfect grade in a makeup final could not raise the grades from F, in which case F is the proper grade, irrespective of the missed final.

If the student fails to complete some other major portion of the course work (examination, quizzes, major paper, etc.) a letter grade (A, B, C, D, F) should be assigned. This grade can be changed, upon petition, when the deficiency which led to the assigned letter grade is made up to the satisfaction of and in the manner prescribed by the instructor.

All deficiencies must be made up in the prescribed manner no later than the quarter following the recording of the grade.

***Grade Reports**

An official grade report will be mailed approximately three weeks after the quarter is completed to each registered student. Grades will not be given over the telephone or at the Registrar's Office.

Auditing Policy

Students are permitted to audit courses upon filing the usual registration forms and paying the regular tuition fees. There is no reduction in fees for auditing. An auditor may participate in class discussion, complete papers and projects and take tests and examinations for informal evaluation, if desired. However, regardless of the amount or quality of work completed, **no academic credit will be granted at any time for courses audited.**

Audit Procedure

The student's decision to take a course on an audit basis must be communicated in writing to the Registrar prior to the fourth class meeting of the course. No exception to this procedure can be approved without authorization by the Academic Standing Committee of the College.

Calculation of Quality Point Average

1. When the student has more than one grade in the same course, the most recent grade will be used in the calculation of the quality point average.
2. A grade of "I" will not be considered in the calculation of quality point average.
3. Although advanced standing credits (ASC) allowed for acceptable work completed at other institutions by transfer students count toward completion of the quantitative credit requirements, neither the credits nor the grades earned in such courses are included in quality point average computations.

For example, a student who has registered for seven courses, cleared a failure in one of them, and received advanced standing credit (ASC) in another, may calculate his quality point average as follows:

*A supplementary grade report will be issued when the missing grade is received. Please do not call the Registrar's Office for it. University regulations prohibit issuing grades by telephone.

S, U, X, I and L grades are not included in the Quality Point Average. "S" grades are included in "Earned Hours" toward the degree. Cumulative totals do not appear on reports for non-matriculated students.

Grade Achieved	Numerical Equivalent	Credit Hours			Quality Points
A	4.0	×	4	=	16.0
B	3.0	×	4	=	12.0
C	2.0	×	3	=	6.0
D	1.0	×	3	=	3.0
F	0.0	×	2	=	0.0
F B	3.0	×	2	=	6.0
I	—	×	—	=	—
ASC	—	×	—	=	—
		Totals	18		43.0

$$\text{Quality Point Average} = \frac{\text{Total Quality Points (43.0)}}{\text{Total Credit Hours (18)}} = 2.389$$

Academic Probation

Students whose scholarship in any given period is unsatisfactory may be dropped from the College or may be placed on probation.

Disciplinary Action

The Committee on Regulations and Discipline has the authority to dismiss from the College or place on probation at any time or to strike from the list of candidates for the degree, any student deemed unworthy because of conduct or character.

Maximum Course Load

New students may elect up to five (5) subjects per quarter without special permission.

Former students, who are not on the Dean's List, may also elect up to five (5) subjects per quarter without special permission. Program Directors may allow six (6) subjects if the student has a 2.50 Q.P.A. or better.

Dean's List students may elect any number of subjects per quarter not to exceed sixteen (16) quarter hours without special permission.

Not all the courses listed in this bulletin will be offered. A final list of those classes to be offered will be contained in the University College Schedule of Courses which gives the hours, days and location of classes. This schedule is issued prior to the Fall, Winter, Spring, and Summer Quarters.

Changes in Requirements

The continuing development of University College forces frequent revision of curricula. In every new bulletin some improvements are indicated. When no hardship is imposed on the student because of changes, and when the facilities of the school permit, the student is expected to meet the requirements of the latest bulletin. If the student finds it impossible to meet these requirements, the bulletin for the year in which he entered becomes the binding one.

tuition and fees

Tuition and fees are refundable only as stated under "Refund of Tuition." Checks and drafts for all charges are to be drawn to the order of Northeastern University.

Initial Registration Fee

A ten dollar (\$10.00) registration fee, required of all new students is due and payable upon registration. This fee is nonrefundable.

Tuition

Tuition for all credit courses is \$32.00 per quarter hour of credit. Charges for registration and tuition for special courses are at the rate specified for each course. Students are permitted to audit courses, however, there is no reduction in fees for auditing.

Non-credit courses are charged at quarter hour rates comparable to those of credit courses meeting on an equivalent contact hour schedule.

Students are not permitted to attend class sessions or take any examination or test until they have paid their tuition fees or have made satisfactory arrangements for payment.

Students will not be advanced in class standing, or permitted to re-enroll in the University, nor will degrees be conferred until all financial obligations to the University have been met.

No certificate of honorable dismissal will be issued to any student who has not fully met his financial obligations to the University.

Tuition Budget Payment Plans

Occasionally situations develop—usually beyond the control of the student—which make it difficult to meet the payments in the manner outlined above. Under such circumstances the student is advised to discuss his problem personally at the Bursar's Office, where one of the budget plans or a deferred payment agreement may be worked out. Such arrangements should be made before the end of the first week of the quarter or within one week of the date of registration if the student enters late. A charge of \$2.00 will be made. Failure to take immediate action will result in a late payment fee of \$10.00.

Tuition Underwritten by Employers

An increasing number of companies are underwriting part or all of the cost of tuition of students in their employ. In cases where payment is to be made directly by the employer to the University, the student should furnish to the Bursar's Office a purchase order covering his registration or a statement from an officer of his company certifying that the company is underwriting the tuition.

Veterans' Benefits

Any veteran covered by Public Law 89-358 should report to Room 245 Richards Hall to fill out the proper enrollment forms.

Late Payment Fee

Bills for tuition and fees are payable on or before Saturday of the week of issuance. A late payment fee of \$10.00 is charged for all students failing to comply unless special payment arrangements are approved by the Bursar's Office.

Refund of Tuition

The general policy in all schools and colleges of the University with respect to refunds of tuition to students is as follows:

The University provides all instruction on an academic quarter basis for which students pay at the beginning of each quarter. Tuition refunds will be granted through the first four weeks of a quarter only when specific conditions are met. Questions regarding refunds should be discussed with the Bursar.

Tuition refunds will be granted only on the basis of the date appearing on the official withdrawal application when filed with the Registrar in Room 120 Hayden Hall. Non-attendance does not constitute official withdrawal.

Refunds will be granted in accordance with the following schedule:

official withdrawal filed within:	percentage of tuition
1st week of quarter	100%
2nd week of quarter	75%
3rd week of quarter	50%
4th week of quarter	25%

Courses in Other Departments of the University

University College students assigned to courses in other departments of the University are charged the tuition rates and other fees effective in the departments in which they are enrolled.

Student Center Fee

All students in University College on the Huntington Avenue Campus are charged \$.75 each quarter for the services available in the Student Center.

Laboratory Fee

All students enrolled in chemistry, biology, or health professions courses which include laboratory must purchase from the Bursar's Office a Laboratory Fee and Deposit Card for \$15.00 (\$5 for extra cards). The fee for arts and crafts courses is \$5.00. Upon completion of the course or withdrawal during the quarter, the student must check out his status with the laboratory attendant. The Bursar's Office will then refund any unused balance shown on the Laboratory Fee and Deposit Card.

Graduation Fee

The University graduation fee, charged to those who are candidates for the baccalaureate or associate degree, is \$25.00 payable on or before May 1 of the year in which the student expects to graduate.

Missed Final Examination Fee

Students absent from the regularly scheduled final examination at the end of a course may petition for a "Missed Final Examination." The fee for each examination requested by the student is \$5.00. The fee must be paid when the petition is filed in the University Registrar's Office.

Transcripts

Students may request transcripts of their grades at the Registrar's Office. There is a charge of \$1.00 per copy, payable in advance.

financial aid

General information pertaining to financial aid opportunities and specific scholarship applications for part-time students are available in the University College Admissions Office, Room 102 Churchill Hall.

The following scholarships and awards are available to students enrolled in University College.

Professor Joseph A. Mullen Scholarships

The Massachusetts Chapter of the American Society of Training and Development has established a fund to provide annual scholarship awards to deserving part-time students upon the recommendation of the Dean of University College.

Dean Russell Whitney Memorial Scholarship

Alpha Chapter of the Pi Tau Kappa Fraternity sponsors an annual tuition scholarship in memory of former Dean Russell Whitney. The award is made available to the man in University College whose qualities of leadership and influence on his fellow students, strength of character, and record of scholarship and broad achievement mark him as outstanding. The award is made available to the student who has completed a minimum of 80 quarter hours. To be eligible for this scholarship, the student must pursue a normal schedule during the year in which the award is made.

Martin Luther King Jr. Scholarships

Established in 1969 in memory of the late Rev. Martin Luther King Jr. Awards are made as openings occur, to adults from minority groups who would otherwise be unable to continue their education. Stipends will cover tuition expenses not to exceed six quarter hours in any academic quarter (excluding Summer Quarter).

Kappa Tau Phi Scholarships

Kappa Tau Phi Sorority annually makes available scholarship awards. They are granted to women students in the liberal arts, business, and engineering programs, respectively, who rank highest in their class at the end of the upper-middle year. In the event the student is eligible for an award of greater monetary value, the award will be made to the next highest-ranking

woman student. To be eligible for this scholarship, the student must be enrolled in a program of at least two evenings per week and must be a candidate for the bachelor's degree. In determining this award, grades of all courses completed in prior years shall be considered.

Harry Olins Scholarship

The Harry Olins Scholarship Fund was established as an expression of firm belief in University College students and "what they stand for." The fund, presented by Mrs. Harry Olins in recognition of her husband's long service on the faculty, makes available an annual tuition award to two students who in terms of scholastic achievement, character, and personal need best typify the spirit of Northeastern University.

To be eligible for this award, the student must be a degree candidate and carry a full academic load during the school year.

Northeastern University Alumni Club of Lowell Scholarships

The Northeastern University Alumni Club of Lowell awards scholarships annually to evening students in University College from the Greater Lowell area who demonstrate high scholastic ability and are in need of financial assistance. Students interested should obtain an application in the University College office, 102 Churchill Hall. Upon filing an application and submitting a resume, the student will be required to complete an interview with the Scholarship Committee of the Alumni Club of Lowell.

Pilot Freight Carriers Scholarships

Pilot Freight Carriers, Winston-Salem, North Carolina, awards \$500 annually to advanced transportation students who have achieved high academic standing and who have paid their tuition expenses without prior aid. The award may be shared by more than one student. Potential recipients are designated by the Director of the Transportation Institute, and a final determination is made by the Dean of University College.

University College Faculty Club Memorial Scholarship Awards

The Faculty Club of University College, Northeastern University, offers two awards annually, primarily for excellence in studies, to Bachelor of Science degree candidates in University College who have carried, and are currently carrying, a minimum of 24 quarter hours annually. Applications, available during the Winter Quarter, must be returned before the Spring Quarter.

These awards shall be known as University College Faculty Club Memorial Scholarship Awards in commemoration of the Club's deceased members.

U.S. Navy Field Training Supervisors Association Memorial Scholarship

A scholarship fund has been established by the generosity of the United States Navy Field Training Supervisors Association, in commemoration of the Association's deceased members. The Scholarship is awarded annually

to a deserving student, selected by the Committee on Scholarships, who is a Management major, working toward a Bachelor of Science degree in the evening program of University College.

Traffic Club of New England Scholarship

The Traffic Club of New England provides 12 basic and four advanced scholarships annually for persons employed in transportation and industry traffic departments. The scholarships are divided equally between industry and carrier applicants, and each award is applicable toward tuition, books, and incidental expenses involved in Transportation Management courses. The purpose of the plan is to afford a limited number of young men an opportunity to expand and improve their education by systematized study in courses in the field of transportation and traffic management. The scholarships are administered cooperatively with the Scholarship Committee of the Traffic Club of New England. Applications may be secured from and filed with the Secretary, The Traffic Club of New England, 294 Washington Street, Boston, Massachusetts 02108.

Sigma Epsilon Rho Scholarships

University College's scholastic honor society, Sigma Epsilon Rho, annually awards plaques and scholarships for outstanding scholastic achievement to the highest-ranking students in University and Lincoln Colleges at the end of their junior year.

Community Sources

Students and their families are urged to explore community, industrial, and foundation sources for collegiate financial aid. Parental employers or the appropriate union organization may be a source. In addition, local, civic, political, religious or educational leaders are often aware of aid sources in immediate community. Some typical sources may include: P.T.A., Kiwanis, Lions, Elks, Knights of Columbus, Masons, Sons of Italy, Rotary, State Rehabilitation, American Legion, etc.

University Grants

Each year Northeastern University grants a substantial number of full and partial tuition grants to students who have demonstrated both above-average scholastic achievement and financial need. All applications for aid are automatically considered for all grants administered by the University. It is not necessary for an applicant to specify the grant in which he is interested.

National Direct Student Loan

This program is available to students who are carrying at least one-half the normal academic workload, are accepted as degree candidates, and who show evidence of financial need.

The Federal maximum which a graduate student may borrow while pursuing his post-baccalaureate degree is \$5000.

Repayment and interest on these loans does not begin until nine months after the student ceases to carry at least a half-time academic load at an institution of higher education. The repayment of principal may be extended over a ten-year period with the interest at the rate of 3 percent per annum. Repayment may be deferred up to a total of three years while a borrower is serving as a Peace Corps or VISTA volunteer.

Guaranteed Student Loan Program

Under this program, students who are matriculated degree candidates, enrolled for at least one-half the normal academic work load, may borrow from a participating bank or other financial institution. Terms and conditions vary from state to state, but a student generally may borrow up to \$1,500 a year (the law allows a maximum of \$2,500 per year) depending on financial need. The federal government pays the interest while the student is in school if the student is eligible for interest subsidy.

The student must have submitted, through the College Scholarship Service, a Parents' Confidential Statement, or if he has been declared financially independent by the Financial Aid Office, a Students' Confidential Statement. These forms are available in the Financial Aid Office.

Applications for the loan itself are available from local banks or the Education Office of your state government. Additional information and necessary application forms for Massachusetts residents are available from the Financial Aid Office.

Veterans' Benefits

Any veteran covered by the Veterans Readjustment Act of 1966, Public Law 89-358, should report to Room 245 Richards Hall to fill out the proper enrollment forms. These forms will be made available during registration periods for all students in the Law Enforcement Programs at special off-campus locations.

Students needing additional information as to eligibility, allowances, or other details are urged to contact their local office of the Veterans Administration as early as possible.

Law Enforcement Assistance Administration

The Law Enforcement Assistance Administration, U.S. Department of Justice, has set up an Office of Academic Assistance under authority of the Omnibus Crime Control and Safe Streets Act of 1968, Public Law 90-351. Through the University, loans up to \$2200 per year for tuition and grants up to \$250 per academic quarter for tuition and fees are available to law enforcement personnel in undergraduate or graduate programs leading to degrees or certificates in areas directly related to law enforcement.

The loans, limited to full-time students in or preparing for law enforcement or corrections careers, are cancelled at the rate of 25 percent for each year the recipient subsequently serves in law enforcement at federal, state, or local level.

The grants are available to full-time or part-time students employed in a publicly-funded law enforcement agency, and involve a signed agreement to remain in the service of a law enforcement agency employing such applicant for two years following completion of the course for which aid was given.

Applications for loans or grants should be obtained from the Office of Financial Aid, Room 252 Richards Hall.

Sigma Epsilon Rho Honor Society Scholarship Award

The Sigma Epsilon Rho Society Scholarship Award, established in 1974 by the membership of the Society, is awarded annually to an undergraduate Student of University and/or Lincoln College at Northeastern University. Eligible students must have a cumulative Quality Point Average of 3.0 or better after completing 80 percent or more of their required studies.

Please note that aid granted from programs sponsored by the federal government are dependent upon the amount of funds allocated to Northeastern.

The University does not award financial assistance in any form to non-citizens of the United States.

student activities

Student activities for part-time students are planned, organized, and operated by the student body with the assistance of the Director of University-Lincoln College Student Activities. The programs are designed to keep pace with the changing needs of adult students and to provide maximum opportunity for student participation. All part-time students in University College and Lincoln College are welcome to participate.

The program is flexible in nature and pioneering in spirit to meet the needs of adult students. The Office of University-Lincoln College Student Activities is particularly interested in developing new clubs which will benefit students professionally and educationally. If students wish to start clubs related to their professions, this office will help them plan and organize clubs on the local and national level. The program is dedicated to assisting the adult student in the development of his fullest potential. The University-Lincoln College Student Activities Office is located in 102 Churchill Hall.

Purpose

The purposes of part-time student activities are:

To provide opportunities for the development and pursuit of cultural interests and professional objectives.

To encourage the development of leadership activities and skills.

To enable the student to identify more closely with the University.

To include the family, as an important and vital motivating force, in the part-time student's educational career.

Sigma Epsilon Rho Honor Society

Sigma Epsilon Rho is the honor society of University College. Its purposes are:

To promote acquaintance and good fellowship among those students who have attained highest scholastic standing in the College.

To stimulate the student body to higher scholastic accomplishment through the bearing, influence, and work of these selected men and women.

To develop methods of mutual improvement and advancement among members.

To support high moral, professional, and scholastic ideals.

Only honor graduates or seniors with honor standing at the end of the junior year are eligible for admission to the society. Admission is by invitation after nomination by the society.

An outstanding book is awarded each year by Sigma Epsilon Rho Society to the highest-ranking student at the conclusion of the junior year. Students will receive the award only in the event that they enroll for the subsequent year.

Kappa Tau Phi Sorority

Kappa Tau Phi Sorority is a social organization open to all part-time women students. Its purpose is to promote fellowship among the women students so that they may become better acquainted and form a closer tie with the University. Two scholarships are awarded annually to scholastically superior women students.

Lambda Alpha Epsilon

Lambda Alpha Epsilon is a national law enforcement fraternity founded in 1957. The Northeastern Chapter Kappa Phi Beta is open to part-time and day students enrolled in Law Enforcement and Security Programs, and also to professional men in the fields of law enforcement and security. The fraternity is dedicated to the furtherance of professional standards in law enforcement.

Pi Tau Kappa Fraternity

Pi Tau Kappa is a social fraternity open to all evening students. It is organized to enhance their social welfare and promote closer affiliation with the University.

Evening Student Council

The Evening Student Council was formed to provide a representative body to promote the welfare of the student body in non-academic areas and to foster extracurricular activities which will enrich University life. It affords participants opportunities to meet and develop close personal relationships with fellow students and the administrative staff.

The Evening Student Council provides students with opportunities to develop leadership skills and gives them a chance to discuss matters of professional interest with experts in their chosen field.

The Council is made up of interested students in University and Lincoln College, representatives of part-time interest groups, and those specially

certified by the Council because of their demonstrated interest in the overall adult programs of the University.

The E.S.C., a member of the United States Association of Evening Students, meets evenings on a monthly basis in the Student Center. Students are welcome to visit, observe, and express opinions concerning part-time student life. Free refreshments are served at all meetings.

Use of Gymnasium Facilities

Specific schedules for use of the Pool, Weight Training Room, Indoor Athletic Field and Track, Handball Courts, Gymnasium, and Wrestling Room are set up each quarter for use by all part-time students. In order to become eligible, students must obtain a temporary Gymnasium Pass each time they wish to use the Cabot Gymnasium Complex. Passes are available in the Cabot Complex, Monday through Friday from 4:30 p.m. to 9:00 p.m. and on Saturday and Sunday from 1:00 p.m. to 4:00 p.m. All students requesting a pass must present their Student Identification Card prior to receiving a pass. Passes are issued on a first-come, first-served basis. Students using the Cabot Gymnasium Complex are required to abide by all the Rules of the Gym and may be asked to complete a Medical Release form.

Evening Ski Club

The Evening Ski Club was established as a special interest club by students in University and Lincoln College to give skiers an opportunity to meet other skiers for the purpose of promoting the sport and its related activities. Events sponsored by the Evening Ski Club include wine and cheese parties held locally and in the various ski areas of Maine, New Hampshire, and Vermont. A summer clambake is also arranged on a local beach, usually in July or August. Meetings are held from October through April on a bi-weekly basis on the main campus. Students interested should contact the Evening Student Activities Office in 102 Churchill Hall.

Alumni Association

More than 52,000 alumni are members of the all-University Alumni Association which has as its prime purposes the promotion of the welfare of Northeastern University, the establishment of a mutually beneficial relationship between the University and its alumni, and the perpetuation of fellowship among members of the Association.

The Alumni Relations office is located in Room 101, Ell Student Center. The official records and addresses of alumni are maintained in Room 260, United Realty Building.

Activities of the Association, including the Homecoming Day celebration and the annual presentation of Professional Promise Awards to outstanding seniors in Lincoln and University Colleges, are directed by the Vice Presi-

dent for Alumni Affairs. Alumni officers also attend meetings of the undergraduate classes to form a closer relationship between the Association and its future members.

The Alumni Relations Office assists the various class officers in planning class reunions. Each class normally holds a reunion every five years during the month of June. The Vice President for the Alumni Class Council is responsible for coordinating class activities and organizing class functions.

The Vice President for Alumni Clubs works in close association with officers of the more than 50 Regional Alumni Clubs which have been established from coast to coast. All alumni are eligible to become members of these organizations. The alumni clubs meet periodically, often in conjunction with visits from members of the faculty or with athletic events.

For Boston area alumni, monthly luncheon meetings are held in both the downtown and uptown sections of the city.

The Association also sponsors and assists the Alumnae Organization and the Varsity Club, both of which have their own officers and conduct various programs throughout the year. Through the Varsity Club, the Association presents trophies to the outstanding athlete of the year in each of the five major sports.

One of the most recent developments in alumni activities is the organization of seminars which are conducted by the Association in cooperation with the University's Center for Continuing Education. The seminars are designed particularly for alumni who have a special interest in current events and the field of adult education.

The Northeastern University Alumni Association is a member of the American Alumni Council, a professional organization composed of representatives of all major colleges and universities in the United States and Canada.

Alumni Relations

The Alumni Association is providing a uniquely valuable service to both the University and the community by sponsoring admissions conferences for parents of high school students who are interested in attending college. These meetings, held in cooperation with the Northeastern Department of Admissions, have been extremely well attended. Local residents as well as Alumni of the University have been invited to these conferences which help to clarify many of the questions today's parents and young people have concerning application procedures of colleges and universities.

programs of study

University College conducts part-time educational programs at the undergraduate level during day and evening hours. The programs are designed to meet the varying needs and interests of adult students who may enroll as (1) *Regular* students following degree programs or as (2) *Special* students taking single courses or special programs.

University College programs leading to the Bachelor of Science and Bachelor of Arts degrees provide opportunities for cultural and professional development equivalent in quality and scope to those offered in the conventional four-year college enrolling full-time students. The bachelor's degree requires 174 quarter hours of credit.

Programs leading to the Associate in Science degree provide students a background in fundamental areas in business administration, liberal arts, health professions, therapeutic recreation services, and law enforcement. The Associate degree requires 96 quarter hours of credit and is equivalent to the conventional two-year or junior college in scope and quality.

Degree curricula are offered in the following areas:

BUSINESS ADMINISTRATION

Major	Degree	Page
Business Administration	Associate in Science	56
Electronic Data Processing	Associate in Science	58
Purchasing	Associate in Science	60
Real Estate	Associate in Science	62
Accounting	Bachelor of Science	64
Finance	Bachelor of Science	65
Industrial Management	Bachelor of Science	67
Industrial Technology	Bachelor of Science	68
Insurance	Bachelor of Science	69
Management	Bachelor of Science	70
Management Information Systems	Bachelor of Science	71
Marketing	Bachelor of Science	73
Personnel and Industrial Relations	Bachelor of Science	74
Transportation and Physical Distribution Management	Bachelor of Science	75
Combined Program in Liberal Arts and Management	Bachelor of Science	77

LIBERAL ARTS

Major	Degree	Page
Economics	Bachelor of Arts	83
English	Bachelor of Arts, Bachelor of Science	84
Fine Arts	Bachelor of Arts, Bachelor of Science	85
History	Bachelor of Arts	87
Liberal Arts	Associate in Science	88
Music	Bachelor of Arts, Bachelor of Science	97
Political Science	Bachelor of Arts	89
Psychology	Bachelor of Arts	92
Sociology-Anthropology	Bachelor of Arts, Bachelor of Science	94
Chemical-Biological Technology	Associate in Science	99
Chemical-Biological Technology	Bachelor of Science	100

LAW ENFORCEMENT

Major	Degree	Page
Correctional Practices	Bachelor of Science	104
	Associate in Science	108
Law Enforcement	Bachelor of Science	110
	Associate in Science	114
Security	Bachelor of Science	116
	Associate in Science	120

HEALTH PROFESSION PROGRAMS

Major	Degree	Page
Health Science	Bachelor of Science	124
Management in Health Agencies and Institutions	Bachelor of Science	126
Medical Laboratory Science Cytotechnology	Bachelor of Science	137
	Associate in Science	137
Medical Technology	Bachelor of Science	140
	Associate in Science	140
Medical Record Administration	Bachelor of Science	130
	Certificate	132
Nursing Home Administration	Certificate	128
Radiologic Technology	Associate in Science	143
Respiratory Therapy	Associate in Science	134
Medical Laboratory Science Hematology	Bachelor of Science	145

EDUCATION

Major	Degree	Page
Teaching of English (in grades 7-12)	Bachelor of Science	150

Course descriptions are listed in numerical order by department beginning on page 151.

THERAPEUTIC RECREATION SERVICES

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business administration

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Aims

Business Administration programs of study are offered to meet the needs of adult men and women wishing to acquire a college education on a part-time basis. The opportunity to achieve professional competence in a chosen field, while developing potential for further managerial growth, is one of the program's principal objectives. Degree programs are designed to create both a breadth of perspective and a degree of specialization. Breadth of perspective will be obtained through exposure to a well-balanced sequence of liberal arts courses, which emphasize fundamental economic laws, and the social and cultural foundations of our changing American society. Specialized knowledge for future managerial growth will be acquired through the study of basic business courses, in addition to a self-determined study of a major business area.

Requirements

Associate in Science Degree

The Associate in Science degree is offered in the following fields of study: Business Administration, Electronic Data Processing, Purchasing, and Real Estate. To qualify for the associate degree 96 quarter hours must be successfully completed in one of the four associate programs. Detailed information on these programs together with a recommended sequence for Completing them appears on the following pages.

New Students—Please Note:

In an effort to achieve a certain level of analytic and academic sophistication among students taking upper level business administration courses (designated by an asterisk wherever they appear in the catalog), University College instituted a new procedure in the Fall Quarter of 1969 whereby all new students are required to successfully complete an appropriate associate degree program before they become eligible to take upper level business administration courses. Special students (students not pursuing a degree program) may take upper level courses if they can demonstrate to a program adviser (always present during registration) or to one of the deans in University College that they have an adequate background to cope with

upper level course content. In determining whether a student has "an adequate background," the program advisers and the deans will evaluate, but not be limited to, such factors as work experience, former college work, independent study, etc.

The "appropriate" program for all bachelor degree students, except the Management Information Systems (MIS) degree student, is the Associate degree program in Business Administration. The "appropriate" program for the MIS degree student is the Associate degree program in Electronic Data Processing (EDP). Students pursuing one of the other associate programs or students pursuing an "inappropriate" associate program (e.g., student following EDP associate program who wants to major in finance in his bachelor's program) may make special arrangements with the Dean of Admissions or the Director of Business Programs for a bachelor's program.

A student with a 2.0 average or better in an Associate degree program will be considered by University College as having "successfully completed" the program. It should be noted that students do not have to formally receive Associate degrees; successful completion of the Associate degree program (or demonstration of an "adequate background" in the case of special students) is all that is necessary for entry into upper level business administration courses.

The Bachelor of Science Degree

The Bachelor of Science degree in Business Administration is offered in the following fields of study: Accounting, Finance, Industrial Management, Industrial Technology, Insurance, Management, Management Information Systems, Marketing, Personnel, and Industrial Relations, Transportation and Physical Distribution Management, and in the Combined Program in Liberal Arts and Management.

In general, the Bachelor of Science degree requires successful completion of the following areas of study:

Liberal Arts	quarter hours
Basic Courses and Electives	70
Business Administration	
Basic courses	66
Major Field of Study	30
Electives (Business Administration or Liberal Arts)	8
Total	174

Detailed information on these programs appears on the following pages.

English Requirements

The English requirements shall be fulfilled by taking Composition and Rhetoric I, II (30.601, 30.602), Introduction to Literary Forms I, II (30.604, 30.605) and four additional hours of literature. Please review the appropriate detailed program information. For new English requirements see explanation on page 209.

BUSINESS ADMINISTRATION**Associate in Science Degree**
quarter hours**Basic Courses—Liberal Arts**

10.327,	10.328,	10.329	Mathematics I, II, III	6	
16.501,	16.502,	16.503	Earth Science I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
23.501,	23.502,	23.503	Western Civilization I, II, III	6	
	30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles & Problems I, II, III	6	
39.511,	39.512,	39.513	Statistics I, II, III	6	44

Basic Courses—Business Administration

41.501,	41.502,	41.503	Accounting Principles I, II, III	6	
43.501,	43.502,	43.503	Introduction to Marketing I, II, III	6	
44.501,	44.502,	44.503	Finance & Risk Management I, II, III	6	
45.506,	45.507,	45.508	Production Management and Manufacturing Systems I, II, III	6	
45.501,	45.502,	45.503	Management & Organization I, II, III	6	
	45.511,	45.512	Human Relations in Organizations I, II	4	
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6	
		45.599	Basic Computer Programming	2	
	45.610,	45.611	Labor Management Relations I, II	4	
		45.667	Project Planning and Control	2	48

Electives

Literature	4	4
Total Credits		96

Students following a degree program should refer to suggested course sequence on the opposite page.

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

19.508,	19.509	Fundamentals of Psychology I, II	8*
23.509,	23.510	Western Civilization A, B	6
	30.603	Composition and Rhetoric	4
	30.606	Introduction to Literary Forms	4
	41.541	Accounting Principles	6
	43.504	Introduction to Marketing	6
	44.504	Finance & Risk Management	6
	45.641	Human Relations In Organization	4
	45.642	Production Management and Manufacturing Systems	6
	45.648	Electronic Data Processing	6
	45.652	Management and Organization	6
	45.690	Labor Management Relations	4

*Additional 2 quarter hours of credit may be applied to Liberal Arts Electives in B.S. degree programs.

BUSINESS ADMINISTRATION**Recommended Course Sequence for the 4-Year Program
Leading to the Associate in Science Degree**

	Quarter I	Quarter II	Quarter III
1st Year	Comp. & Rhet. I Accounting I Mgmt. & Org. I Earth Science I	Comp. & Rhet. II Accounting II Mgmt. & Org. II Earth Science II	Elective Accounting III Mgmt. & Org. III Earth Science III
2nd Year	Economics I Math. I Marketing I Fin. & Risk I	Economics II Math. II Marketing II Fin. & Risk II	Economics III Math. III Marketing III Fin. & Risk III
3rd Year	West. Civ. I Psych. I E.D.P. I Labor Mgmt. I	West. Civ. II Psych. II E.D.P. II Labor Mgmt. II	West. Civ. III Psych. III E.D.P. III Elective
4th Year	Intro. Lit. Forms I Stat. I Prodn. Mgmt. I Basic Computer Programming	Intro. Lit. Forms II Stat. II Prodn. Mgmt. II Hum. Rel. I	Project Planning Stat. III Prodn. Mgmt. III Hum. Rel. II

ELECTRONIC DATA PROCESSING**Associate in Science Degree**
quarter hours**Basic Courses—Liberal Arts**

10.327,	10.328,	10.329	Mathematics I, II, III	6	
16.501,	16.502,	16.503	Earth Science I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
29.501,	29.502,	29.503	Effective Speaking I, II, III	6	
	30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles & Problems I, II, III	6	
39.511,	39.512,	39.513	Statistics I, II, III	6	44

Basic Courses—Business Administration

41.501,	41.502,	41.503	Accounting Principles I, II, III	6	
44.501,	44.502,	44.503	Finance & Risk Management I, II, III	6	
45.501,	45.502,	45.503	Management and Organization I, II, III	6	
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6	24

Major Field of Study

10.332,	10.333,	10.334	Mathematics for Business Management I, II, III	6	
45.573,	45.574,	45.575	Computer Programming for Business I, II, III	6	
		45.577	Data Systems Administration	2	
	45.578,	45.579	Business Data Processing Applications I, II	4	
		45.667	Project Planning and Control	2	
45.586,	45.587,	45.588	Systems Design and Techniques I, II, III	6	26

Electives

Liberal Arts 2 2

Total Credits**96**

Students following a degree program should refer to suggested course sequence on the opposite page.

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

19.508,	19.509	Fundamentals of Psychology I, II	8*
	30.603	Composition and Rhetoric	4
	30.606	Introduction to Literary Forms	4
	41.541	Accounting Principles	6
	44.504	Finance and Risk Management	6
	45.644	Computer Programming for Business	6
	45.648	Electronic Data Processing	6
	45.652	Management and Organization	6
	45.689	Systems Design and Techniques	6

*Additional 2 quarter hours of credit may be applied to Liberal Arts electives.

ELECTRONIC DATA PROCESSING**Recommended Course Sequence for the 4-Year Program
Leading to the Associate in Science Degree**

	Quarter I	Quarter II	Quarter III
1st Year	Comp. & Rhet. I E.D.P. I Mgmt. & Org. I Math. I	Comp. & Rhet. II E.D.P. II Mgmt. & Org. II Math. II	Elective E.D.P. III Mgmt. & Org. III Math. III
2nd Year	Economics I Accounting I Math. for Bus. Mgmt. I Comp. Prog. Bus. I	Economics II Accounting II Math. for Bus. Mgmt. II Comp. Prog. Bus. II	Economics III Accounting III Math. for Bus. Mgmt. III Comp. Prog. Bus. III
3rd Year	Fin. & Risk I Psych. I Sys. Des. Tech. I Stat. I	Fin. & Risk II Psych. II Sys. Des. Tech. II Stat. II	Fin. & Risk III Psych. III Sys. Des. Tech. III Stat. III
4th Year	Intro. to Lit. Forms I Effective Spking. I Data Sys. Adm. Earth Science I	Intro. to Lit. Forms II Effective Spking. II Bus. Data Proc. Appl. I Earth Science II	Project Planning Effective Spking. III Bus. Data Proc. Appl. II Earth Science III

PURCHASING**Associate in Science Degree****Basic Courses—Liberal Arts**

				quarter hours	
10.327,	10.328,	10.329	Mathematics I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
	30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	
39.511,	39.512,	39.513	Statistics I, II, III	6	32

Basic Courses—Business Administration

41.501,	41.502,	41.503	Accounting Principles I, II, III	6	
44.501,	44.502,	44.503	Finance and Risk Management I, II, III	6	
45.501,	45.502,	45.503	Management and Organization I, II, III	6	
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6	24

Major Field of Study

		43.520	Industrial Marketing	2	
	45.510,	45.611	Labor Management Relations I, II	4	
	45.511,	45.512	Human Relations in Organizations I, II	4	
		45.536	Principles of Material Inspection	2	
45.537,	45.538,	45.539	Purchasing I, II, III	6	
45.541,	45.542,	45.543	Law I, II, III*	6	
45.623,	45.624,	45.625	Manufacturing Processes I, II, III	6	
	45.627,	45.628	Value Management, I, II,	4	
		45.626	Professional Purchasing Techniques*	2	36

Electives

Literature	4	4
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Total Credits**96**

Students following a degree program should refer to suggested course sequence on the opposite page.

Additional Departmental Offerings

45.666	Materials Acquisition Function	2
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Please see page 242 for course descriptions.

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

			quarter hours
19.508,	19.509	Fund of Psych. I, II	8**
	30.603	Composition and Rhetoric	4
	30.606	Introduction to Literary Forms	4
	41.541	Accounting Principles	6
	44.504	Finance and Risk Management	6
	45.641	Human Relations In Organization	4
	45.648	Electronic Data Processing	6
	45.652	Management and Organization	6
	45.690	Labor Management Relations	4

*Upper level Business Administration course; may be taken in the Purchasing Associate Degree Program.

**Additional 2 quarter hours of credit may be applied to Liberal Arts electives in B.S. degree programs.

PURCHASING**Recommended Course Sequence for the 4-Year Program
Leading to the Associate-in Science Degree**

	Quarter I	Quarter II	Quarter III
1st Year	Comp. & Rhet. I Accounting I Mgmt. & Org. I Math. I	Comp. & Rhet. II Accounting II Mgmt. & Org. II Math. II	Elective Accounting III Mgmt. & Org. III Math. III
2nd Year	Economics I Psych. I Fin. & Risk I E.D.P. I	Economics II Psych. II Fin. & Risk II E.D.P. II	Economics III Psych. III Fin. & Risk III E.D.P. III
3rd Year	Intro. to Lit. Forms I Stat. I Purchasing I Manuf. Proc. I	Intro. to Lit. Forms II Stat. II Purchasing II Manuf. Proc. II	Elective Stat. III Purchasing III Manuf. Proc. III
4th Year	Law I Labor Mgmt. Rel. I Hum. Rel. I Value Mgmt. I	Law II Labor Mgmt. Rel. II Hum. Rel. II Value Mgmt. II	Law III Industrial Mktg. Prin. Mat. Inspec. Prof. Purchasing

REAL ESTATE**Associate in Science Degree****Basic Courses—Liberal Arts****quarter hours**

10.327,	10.328,	10.329	Mathematics I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
23.501,	23.502,	24.503	Western Civilization I, II, III	6	
	30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	
39.511,	39.512,	39.513	Statistics I, II, III	6	38

Basic Courses—Business Administration

41.501,	41.502,	41.503	Accounting Principles I, II, III	6	
44.501,	44.502,	44.503	Finance and Risk Management I, II, III	6	
45.501,	45.502,	45.503	Management and Organization I, II, III	6	
45.541,	45.542,	45.543	Law I, II, III*	6	24

Major Field of Study

47.501,	47.502,	47.503	Real Estate Fundamentals I, II, III	6	
	47.508,	47.509	Real Estate Financial Analysis I, II	4	
		47.511	Fundamental Real Estate Appraisal	2	
	47.512,	47.513	Advanced Real Estate Appraisal I, II	4	
		47.521	Real Estate Development	2	18

Electives

Literature	4	
Liberal Arts	6	
Business Administration	6	16

Total Credits**96**

Students following a degree program should refer to the suggested course sequence on the opposite page.

Additional Department Offerings

45.586,	45.587,	45.588	Systems Design and Techniques I, II, III	6
		47.524	Private Real Estate Law	2
	47.525,	47.526	Public Real Estate Law I & II	4
		47.527	Housing	2
47.528,	47.529,	47.530	Real Estate Management I, II, III	6

Please see page 255 for course descriptions.

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

			quarter hours
19.508,	19.509	Fundamentals of Psychology I, II	8**
23.509,	23.510	Western Civilization A, B	6
	30.603	Composition and Rhetoric	4
	30.606	Introduction to Literary Forms	4
	41.541	Accounting Principles	6
	44.504	Finance and Risk Management	6
	45.652	Management and Organization	6

*Upper level Business Administration course; may be taken in the Real Estate Associate Degree program.

**Additional 2 quarter hours of credit may be applied to Liberal Arts electives.

REAL ESTATE**Recommended Course Sequence for the 4-Year Program
Leading to the Associate in Science Degree**

	Quarter I	Quarter II	Quarter III
1st Year	Comp. & Rhet. I Accounting I Mgmt. & Org. I Math. I	Comp. & Rhet. II Accounting II Mgmt. & Org. II Math. II	Elective Accounting III Mgmt. & Org. III Math. III
2nd Year	Economics I Law I Fin. & Risk I R.E. Fund. I	Economics II Law II Fin. & Risk II R.E. Fund. II	Economics III Law III Fin. & Risk III R.E. Fund. III
3rd Year	Psych. I Stat. I R.E. Fin. Anal. I Elective	Psych. II Stat. II R.E. Fin. Anal. II Elective	Psych. III Stat. III R.E. Development Elective
4th Year	Intro. to Lit. Forms I Fund. R.E. App. Elective Elective	Intro. to Lit. Forms II Adv. R.E. App. I Elective Elective	Elective Adv. R.E. App. II Elective Elective

ACCOUNTING**Bachelor of Science Degree**

				quarter hours	
Associate Degree Program				96	
Core Courses—Liberal Arts					
21.501,	21.502,	21.503	Sociology I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	12
Core Courses—Business Administration					
41.504,	41.505,	41.506	Accounting—Intermediate I, II, III	6	
41.507,	41.508,	41.509	Accounting—Cost I, II, III	6	
44.507,	44.508,	44.509	Corporate Finance I, II, III	6	
45.541,	45.542,	45.543	Law I, II, III*	6	24
Major Concentration Courses					
41.510,	41.511,	41.512	Accounting—Advanced I, II, III*	6	
41.513,	41.514,	41.515	Accounting—Specialized Problems I, II, III*	6	
41.516,	41.517,	41.518	Auditing I, II, III*	6	
41.519,	41.520,	41.521	Federal Income Taxes I, II, III*	6	
41.522,	41.523,	41.524	Seminar in Contemporary Accounting Problems I, II, III*	6	30
Electives					
Liberal Arts				10	
Business Administration or Liberal Arts				2	12
Total Credits					174
Additional Department Offerings					
		41.525	Estate and Gift Taxes	2	
	41.526,	41.527	Corporate and Stockholder Tax Problems I, II	4	
		41.528	Tax Factors in Business Decisions	2	
45.586,	45.587,	45.588	Systems Design and Techniques I, II, III	6	
	45.618,	45.619	Retail Data Processing Applications I, II	4	
	45.655,	45.656	Auditing Data Processing Applications I, II	4	
	45.661,	45.662	Banking Data Processing Applications I, II	4	

Please see page 226 for course descriptions.

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

				quarter hours
21.601,	21.602	Principles of Sociology I, II	8**	
	44.505	Corporate Finance	6	

*Upper level Business Administration course—see p. 54.

**Additional 2 quarter hours of credit may be applied to Liberal Arts electives.

FINANCE

Bachelor of Science Degree

quarter hours

Associate Degree Program

96

Core Courses—Liberal Arts

21.501,	21.502,	21.503	Sociology I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	
	39.517,	39.518	Money and Banking I, II	4	
		39.519	Public Finance	2	18
				—	

Core Courses—Business Administration

41.504,	41.505,	41.506	Accounting—Intermediate I, II, III	6	
44.507,	44.508,	44.509	Corporate Finance I, II, III	6	
44.521,	44.522,	44.523	Credit Management I, II, III*	6	
45.541,	45.542,	45.543	Law I, II, III*	6	24
				—	

Major Concentration Courses—Students Specializing in Savings Banking and Real Estate:

		39.561	Urban Economics	2	
		44.513	Estate Planning*	2	
44.517,	44.518,	44.519	Investments I, II, III*	6	
		44.544	Law of Finance*	2	
47.501,	47.502,	47.503	Real Estate Fundamentals I, II, III	6	
	47.508,	47.509	Real Estate Financial Analysis I, II	4	
		47.511	Real Estate Appraisal	2	24
				—	

Electives

		Liberal Arts	4	
		Business Administration or Liberal Arts	8	12
			—	—
Total Credits				174

Major Concentration Courses—Students Specializing in Commercial Banking:

		44.513	Estate Planning*	2	
44.517,	44.518,	44.519	Investments I, II, III*	6	
	44.531,	44.532	Seminar in Finance I, II*	4	
	44.533,	44.534	International Finance I, II*	4	
		44.544	Law of Finance*	2	
47.501,	47.502,	47.503	Real Estate Fundamentals I, II, III	6	24
				—	—

Electives

		Liberal Arts	4	
		Business Administration or Liberal Arts	8	12
			—	—
Total Credits				174

*Upper level Business Administration course—see p. 54.

Major Concentration Courses—Students Specializing in Corporate Finance:

41.507,	41.508,	41.509	Cost Accounting I, II, III	6	
		41.528	Tax Factors in Decision Making	2	
44.517,	44.418,	44.519	Investments I, II, III*	6	
	44.531,	44.532	Seminar in Finance I, II*	4	
	44.533,	44.534	International Finance I, II*	4	
		44.544	Law of Finance*	2	24
				—	

Electives

Liberal Arts	4	
Business Administration or Liberal Arts	8	12
		—
Total Credits		174

Major Concentration Courses—Students Specializing in International Finance:

39.523,	39.524,	39.525	Government and Business I, II, III	6	
	39.528,	39.529	International Economics I, II	4	
		39.571	European Economic History	2	
44.517,	44.518,	44.519	Investments I, II, III*	6	
	44.531,	44.532	Seminar in Finance I, II*	4	
	44.533,	44.534	International Finance I, II*	4	
		44.544	Law of Finance*	2	28
				—	

Electives

Liberal Arts	4	
Business Administration or Liberal Arts	4	8
		—
Total Credits		174

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

			quarter hours
21.601,	21.602	Principles of Sociology I, II	8**
	44.505	Corporate Finance	6
	44.535	Investments	6

Additional Department Offerings

45.586,	44.545,	44.546	Profit Planning and Control I, II	4
		44.547	Advanced Financial Problems	2
		44.548	Capital Strategy	2
	45.587,	45.588	Systems Design and Techniques I, II, III	6
	45.616,	45.653	Government Data Processing Applications I, II	4
	45.655,	45.656	Auditing Data Processing Applications I, II	4
	45.661,	45.662	Banking Data Processing Applications I, II	4
	45.664,	45.665	EDP in Property and Casualty I, II	4

Please see page 232 for course descriptions.

*Upper level Business Administration course—see p. 54.

**Additional 2 quarter hours of credit may be applied to Liberal Arts electives.

INDUSTRIAL MANAGEMENT**Bachelor of Science Degree**

quarter hours

Associate Degree Program**96****Core Courses—Liberal Arts**

10.332,	10.333,	10.334	Mathematics for Business Management I, II, III	6	
16.511,	16.512,	16.513	History of Science and Technology I, II, III	6	
19.532,	19.533,	19.534	Industrial Psychology I, II, III	6	
39.523,	39.524,	39.525	Government and Business I, II, III	6	24

Core Courses—Business Administration

45.541,	45.542,	45.543	Law I, II, III*	6	
45.670,	45.671,	45.672	Management of Change I, II, III	6	12

Major Concentration Courses

45.533,	45.534,	45.535	Management Decisions and Policies I, II, III	6	
	45.561,	45.562	Statistical Quality Control I, II	4	
		45.563	Management of Quality Control	2	
45.595,	45.596,	45.597	Manufacturing Seminar I, II, III*	6	
45.623,	45.624,	45.625	Manufacturing Processes I, II, III	6	
	45.636,	45.637	Production and Inventory Control I, II	4	
45.638,	45.639,	45.640	Industrial Decision Making I, II, III*	6	
		45.695	Materials Management	2	36
Electives		(Liberal Arts or Business Administration)			6

Total Credits**174****Additional Department Offerings**

		45.519	Work Methods	2	
		45.528	Work Measurement	2	
		45.522	Job Evaluation	2	
	45.526,	45.431	Facilities Planning and Design I, II	4	
		45.530	Standard Data Development	2	
		45.577	Data Systems Administration	2	
45.586,	45.587,	45.588	Systems Design and Techniques I, II, III	6	
		45.620	Industrial Safety	2	
		45.626	Professional Purchasing Techniques	2	
	45.627,	45.628	Value Management I, II	4	
45.685,	45.686,	45.687	Computer Programming for Scientific Applications I, II, III	6	
		45.696	Principles and Practice of Management	2	

Please see page 239 for course descriptions.

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

quarter hours

45.608	Quality Control	4
45.680	Production and Inventory Control	4

*Upper level Business Administration course—see p. 54.

**Additional 2 quarter hours of credit may be applied to Liberal Arts electives.

INDUSTRIAL TECHNOLOGY**Bachelor of Science Degree**

				quarter hours	
Engineering or Science Technology Courses				96	
Core Courses—Liberal Arts					
19.501,	19.502,	19.503	Psychology I, II, III	6	
21.501,	21.502,	21.503	Sociology I, II, III	6	
23.501,	23.502,	23.503	Western Civilization I, II, III	6	
	30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	32
Core Courses—Business Administration					
41.501,	41.502,	41.503	Accounting Principles I, II, III	6	
	43.514,	43.515	Marketing Fundamentals I, II**	4	
45.501,	45.502,	45.503	Management and Organization I, II, III	6	
45.541,	45.542,	45.543	Law I, II, III*	6	
	45.561,	45.562	Statistical Quality Control I, II	4	
		45.563	Management of Quality Control	2	
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6	
	45.610,	45.611	Labor-Management Relations I, II	4	
	45.673,	45.674	Industrial Processes I, II**	4	42
Electives					
			Literature	4	4
Total Credits					174

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

			quarter hours
23.509,	23.510	Western Civ. A, B	6
30.603		Composition & Rhetoric	4
30.606		Introduction to Literary Forms	4
41.541		Accounting Principles	6
45.652		Management and Organization	6
45.690		Labor Management Relations	4
45.608		Quality Control	6
45.648		Electronic Data Processing	6

*Upper level Business Administration course—see p. 54.

**Course substitutions may not be effected.

INSURANCE**Bachelor of Science Degree**

				quarter hours	
				96	
Associate Degree Program					
Core Courses—Liberal Arts					
21.501,	21.502,	21.503	Sociology I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	
	39.517,	39.518	Money and Banking I, II	4	
		39.519	Public Finance	2	18
Core Courses—Business Administration					
	44.511,	44.512	Life Insurance I, II	4	
44.514,	44.515,	44.516	Property and Casualty Insurance I, II, III	6	
45.541,	45.542,	45.543	Law I, II, III*	6	16
Major Concentration Courses					
		44.513	Estate Planning*	2	
	44.525,	44.526	Health and Social Insurance I, II*	4	
		44.527	Group Insurance and Pensions	2	
		44.529	Advanced Property Insurance*	2	
		44.530	Advanced Property—Casualty Insurance*	2	
		44.543	Law of Insurance*	2	14
Electives					
			Liberal Arts	4	
			Business Administration or		
			Liberal Arts	26	30
			Total Credits		174

Additional Department Offerings

45.664, 45.665 EDP in Property and Casualty I, II 4

The following course is frequently offered as a single quarter intensive during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

21.601, 21.602 Principles of Sociology I, II 8**

Please see page 235 for course descriptions.

*Upper level Business Administration course—see p. 54.

**Additional 2 quarter hours of credit may be applied to Liberal Arts electives.

MANAGEMENT

Bachelor of Science Degree

				quarter	hours
Associate Degree Program					96
Core Courses—Liberal Arts					
21.501,	21.502,	21.503	Sociology I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	
30.511,	30.512,	30.513	Business Writing and Reports I, II, III	6	
39.531,	39.532,	39.533	Business Cycles I, II, III	6	24
Core Courses—Business Administration					
44.507,	44.508,	44.509	Corporate Finance I, II, III	6	
45.541,	45.542,	45.543	Law I, II, III*	6	12
Major Concentration Courses					
19.532,	19.533,	19.534	Industrial Psychology I, II, III*	6	
41.533,	41.534,	41.535	Accounting for Management Decisions I, II, III	6	
43.532,	43.533,	43.534	Marketing Management I, II, III*	6	
45.523,	45.524,	45.525	Management Seminar I, II, III*	6	
45.533,	45.534,	45.535	Management Decisions and Policies I, II, III*	6	30
Electives					
				Business Administration or Liberal Arts	12
				Total Credits	174
Additional Department Offerings					
		45.577	Data Systems Administration	2	
45.586,	45.587,	45.588	Systems Design and Techniques I, II, III	6	
	45.603,	45.604	Administrative Management and Office Services I, II	4	
	45.616,	45.653	Government Data Processing Applications I, II	4	
	45.618,	45.619	Retail Data Processing Applications I, II	4	
	45.655,	45.656	Auditing Data Processing Applications I, II	4	
	45.661,	45.662	Banking Data Processing Applications I, II	4	
	45.664,	45.665	EDP in Property and Casualty I, II	4	
		45.667	Project Planning and Control	2	
45.670,	45.671,	45.672	Management of Change I, II, III	6	
		45.696	Principles and Practice of Management	2	
	49.504,	49.505	Strategy for Planning I, II	6	

Please see page 236 for course descriptions.

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

21.601,	21.602	Principles of Sociology I, II	8**
	44.505	Corporate Finance	6

*Upper level Business Administration course—see p. 54.

**Additional 2 quarter hours of credit may be applied towards Liberal Arts electives.

MANAGEMENT INFORMATION SYSTEMS Bachelor of Science Degree

				quarter hours	
Associate Degree Program					96

Core Courses—Liberal Arts

21.501,	21.502,	21.503	Sociology I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	
30.511,	30.512,	30.513	Business Writing and Reports I, II, III	6	18

Core Courses—Business Administration

43.501,	43.502,	43.503	Introduction to Marketing I, II, III	6	
44.507,	44.508,	44.509	Corporate Finance I, II, III	6	
	45.510,	45.611	Labor Management Relations I, II	4	
	45.511,	45.512	Human Relations in Organizations I, II	4	
45.541,	45.542,	45.543	Law I, II, III*	6	26

Major Concentration Courses

45.589,	45.590,	45.591	Advanced Systems Design I, II, III*	6	
45.592,	45.593,	45.594	Advanced Systems Techniques I, II, III*	6	
		45.630	Introduction to Operations Research	2	
	45.631,	45.632	Operations Research Applications I, II*	4	
	45.668,	45.669	Peripheral Systems Techniques I, II	4	22

Electives

Liberal Arts	2
Business Administration or Liberal Arts	10
Total Credits	174

Additional Department Offerings

	45.574,	45.575	Computer Programming for Business I, II	4	
45.685,	45.686,	45.687	Computer Programming for Scientific Applications I, II, III	6	
	45.516,	45.653	Government Data Processing Applications I, II	4	
45.617,	45.618,	45.619	Advanced Comp. Programming I, II, III	6	
	45.655,	45.656	Audit. Data Processing Applications I, II	4	
	45.658,	45.659	Retail. Data Processing Applications I, II	4	
	45.661,	45.662	Banking Data Processing Applications I, II	4	
	45.664,	45.665	EDP in Property and Casualty Insurance I, II	4	
45.677,	45.678,	45.679	Operating Systems I, II, III	6	
45.680,	45.681,	45.682	Computer Communications Systems I, II, III	6	
	45.697,	45.698	Information Processing in Medicine	4	
	49.504,	49.505	Strategy for Planning	6	

Please see page 248 for course descriptions.

*Upper level Business Administration course—see p. 54.

72 / BUSINESS ADMINISTRATION

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

21.601, 21.602	Principles of Sociology I, II	8**
43.504	Introduction to Marketing	6
44.505	Corporate Finance	6
45.641	Human Relations in Organization	4
45.690	Labor Management Relations	4

**Additional 2 quarter hours of credit may be applied towards Liberal Arts electives.

MARKETING**Bachelor of Science Degree**

quarter hours

Associate Degree Program**96****Core Courses—Liberal Arts**

21.501,	21.502,	21.503	Sociology I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	12

Core Courses—Business Administration

43.518,	43.519,	43.522	Retailing & Mass Merchandising I, II, III	6	
45.541,	45.542,	45.543	Law I, II, III*	6	12

Major Concentration Courses

43.507,	43.508,	43.509	Sales Management I, II, III	6	
43.511,	43.512,	43.513	Creative Marketing Communications I, II, III	6	
		43.520	Industrial Marketing	2	
	43.525,	43.526	Market Research I, II*	4	
		43.529	International Marketing	2	
43.532,	43.533,	43.534	Marketing Management I, II, III*	6	
		43.537	Marketing and Sales Seminar*	2	28

Electives

Liberal Arts	10	
Business Administration or Liberal Arts	16	26
Total Credits		174

Additional Department Offerings

		43.530	Consumer Behavior Seminar	2	
		43.536	Introduction to Advertising	2	
	43.541,	43.542	Public Relations I, II	4	
	43.543,	43.544	Salesmanship I, II	4	
		45.577	Data Systems Administration	2	
	45.618,	45.619	Retail Data Processing Applications I, II	4	
45.685,	45.686,	45.687	Computer Programming for Scientific Applications I, II, III	6	
	49.504,	49.505	Strategy for Planning I, II	6	

Please see page 229 for course descriptions.

The following course is frequently offered as a single quarter intensive during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

21.601,	21.602	Principles of Sociology I, II	8**
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*Upper level Business Administration course—see p. 54.

**Additional 2 quarter hours of credit may be applied towards Liberal Arts electives.

PERSONNEL AND INDUSTRIAL RELATIONS Bachelor of Science Degree

			quarter hours	
Associate Degree Program			96	
Core Courses—Liberal Arts				
21.501,	21.502,	21.503 Sociology I, II, III	6	
26.501,	26.502,	26.503 Introduction to Philosophy I, II, III	6	12
Core Courses—Business Administration				
45.541,	45.542,	45.543 Law I, II, III*	6	6
Major Concentration Courses				
45.513,	45.514,	45.515 Personnel Management I, II, III	6	
		45.517 Techniques of Employee Selection	2	
		45.518 Wage and Salary Administration*	2	
		45.521 Employee Benefits and Social Security	2	
		45.522 Job Evaluation	2	
		45.545 Law of Employment Standards*	2	
		45.546 Law of Employment Conditions*	2	
		45.548 Law of Labor Management Relations*	2	
		45.553 The Labor Agreement*	2	
		45.556 Negotiation, Mediation, Arbitration*	2	
		45.560 Seminar on Labor Issues*	2	26
Electives				
		Liberal Arts	10	
		Business Administration or Liberal Arts	24	34
Total Credits			174	
Additional Department Offerings				
		45.552 Advanced Human Relations	2	
		45.557 International Labor Movements	2	
45.670,	45.671,	45.672 Management of Change I, II, III	6	
		46.691 Creative Problem-Solving	2	
49.504,	49.505	Strategy for Planning I, II	6	

Please see page 243 for course descriptions.

The following courses are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

21.601,	21.602	Principles of Sociology I, II	8**
	45.607	Personnel Management	6

*Upper level Business Administration course—see p. 54.

**Additional 2 quarter hours of credit may be applied towards Liberal Arts electives.

TRANSPORTATION AND PHYSICAL DISTRIBUTION MANAGEMENT

Bachelor of Science Degree

Associate Degree Program

quarter hours
96

Core Courses—Liberal Arts

21.501,	21.502,	21.503	Sociology I, II, III	6	6
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Core Courses—Business Administration

43.532,	43.533,	43.534	Marketing Management I, II, III	6	
45.533,	45.534,	45.535	Management Decisions & Policies I, II, III	6	
45.541,	45.542,	45.543	Law I, II, III	6	
48.514,	48.515,	48.516	Elements of Transportation and Distribution I, II, III	6	24

Major Concentration Courses—Students specializing in the Management of Transportation companies:

		45.553	The Labor Agreement	2	
		45.556	Negotiations, Mediation, Arbitration	2	
45.670,	45.671,	45.672	Management of Change I, II, III	6	
48.534,	48.535,	48.536	Surface Transportation I, II, III	6	
		48.537	Surface Transportation IV	2	
48.541,	48.542,	48.543	Air Transportation Management I, II, III	6	
	48.547,	48.548	Urban Transportation I, II	4	
		48.549	Seminar in Selected Topics	2	
		48.600	Seminar in Northeast Corridor Transportation	2	32

Electives

Liberal Arts	10	
Business Administration	6	16
Total Credits		174

Major Concentration Courses—Students specializing in Physical Distribution Management:

		45.526	Facilities Planning and Design I	2	
45.537,	45.538,	45.539	Purchasing I, II, III	6	
	45.636,	45.637	Production and Inventory Control I, II	4	
45.638,	45.639,	45.640	Industrial Decision Making I, II, III	6	
48.504,	48.505,	48.506	Transportation Regulation and Promotion I, II, III	6	
48.527,	48.528,	48.529	Traffic Management I, II, III	6	
		48.537	Surface Transportation IV	2	
		48.538	Management of Warehouse Operations	2	
		48.539	Organization and Control of Physical Distribution Management	2	

48.540	Management Science & Physical Distribution Management	2	
48.549	Seminar in Selected Topics	2	40
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Electives	Liberal Arts	8	8
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	Total Credits		174
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The following course is frequently offered as a single quarter intensive during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details.

21.601, 21.602	Principles of Sociology I, II	8**	
45.680	Production and Inventory Control	4	

Please see page 256 for course descriptions.

**Additional 2 quarter hours of credit may be applied towards Liberal Arts electives.

**COMBINED PROGRAM IN LIBERAL ARTS
AND MANAGEMENT**
Bachelor of Science Degree
LIBERAL ARTS COURSES

Basic Courses				quarter hours	
10.327,	10.328,	10.329	Mathematics I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
23.501,	23.502,	23.503	Western Civilization I, II, III	6	
	30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	32
				<hr/>	
Core Courses					
16.501,	16.502,	16.503	Earth Science I, II, III	6	
21.501,	21.502,	21.503	Sociology I, II, III	6	
22.501,	22.502,	22.503	Principles of Political Science I, II, III	6	
23.504,	23.505,	23.506	American History I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	
39.511,	39.512,	39.513	Statistics I, II, III	6	
Fine Arts:			Art, Music or Theatre Arts	6	
Literature:			English, American, or other in Translation	6	48
				<hr/>	
Electives			Literature	4	
			Liberal Arts	18	22
				<hr/>	

MANAGEMENT COURSES

Core Courses					
41.501,	41.502,	41.503	Accounting Principles I, II, III	6	
43.501,	43.502,	43.503	Introduction to Marketing I, II, III	6	
		44.501	Principles of Finance	2	
		44.502	Principles of Investments	2	
		44.503	Principles of Insurance and Risk Management	2	
44.507,	44.508,	44.509	Corporate Finance I, II, III	6	
45.501,	45.502,	45.503	Management and Organization I, II, III	6	
	45.511,	45.512	Human Relations in Organizations I, II	4	
45.541,	45.542,	45.543	Law I, II, III*	6	
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6	
	45.610,	45.611	Labor Management Relations I, II	4	50
				<hr/>	
Electives—Business Administration					22
				<hr/>	
Total Credits				174	

*Upper level Business Administration course—see p. 54.

**These Liberal Arts courses and all of the MANAGEMENT COURSES listed above with the exception of LAW I, II, III are frequently offered as single quarter intensives during the regular school year. Please refer to the current Schedule of Courses and Registration Guide for details. Any Liberal Arts courses taken as intensive for 8 quarter hours of credit will permit applying the additional 2 quarter hours to the Liberal Arts electives.

liberal arts

Harold Naidus, Associate Dean
Director, Liberal Arts Programs
Telephone 437-2416

Aims

In providing the means to a modern liberal education, University College has the main objective of stimulating and guiding the self-development of the student in three main areas: first, his intellectual growth; second, the development of his character and sense of values; and third, his preparation for, or advancement in, a career.

Intellectual growth—the development of the ability to think independently and creatively—rests upon the foundation of a sound general education. Through the liberal arts curricula, students are guided toward an appreciative understanding of the active discovery of ideas and methods in the areas of humanities, natural science, and social science. With this training, the student can more fully realize the basic values upon which civilization rests and can more fully participate in the intellectual, moral, and material achievement of that civilization.

Through its many programs, University College endeavors to provide experiences conducive to the development of strength of character and a sense of personal responsibility, including such personal qualities as self-reliance, integrity, perseverance, and the ability to work with others.

University College holds that there is no inconsistency between a truly liberal education and preparation for a vocation. As an adventure in intellectual discovery, a liberal education leads to the broadening and intensification of interests as the student becomes aware of his own mental strengths and weaknesses. This discovery is essential for making more intelligent and realistic appraisals of himself and his career. His career brings meaning and focus to his educational experience. His education presents both a challenge to accept responsibility and an opportunity to seek knowledge and skills for himself.

Methods

To enable each student to plan a college program in keeping with his own interests and aptitudes, a wide range of electives is offered. This does not mean that students are free to elect courses indiscriminately, for if they are to obtain a liberal education they must have training in several basic fields.

Therefore, the Curriculum Committee of University College has established basic minimum requirements in each of several fields. These distribution requirements are outlined with each of the program offerings.

Bachelors Degrees

Bachelor of Arts

Matriculated students must petition for the B.A. degree or the former B.S. will be awarded. Matriculating students must indicate their choice of degree programs, if the major department offers the option.

Major fields of study are offered in Economics, English, Art, Political Science, History, Psychology, Sociology-Anthropology, and Music. Students should choose their major field of study and their electives in consultation with a program adviser.

The distribution requirements, including specific required courses are shown with each curriculum.

Each curriculum normally provides for not less than 174 quarter hours of work, including at least 40 quarter hours of advanced work in a major field, and at least 30 quarter hours of elective liberal arts courses.

All candidates for the Bachelor of Arts degree must have satisfactorily completed in college one full year of a modern language beyond the elementary level, 4 q.h. of Composition and Rhetoric and 4 q.h. of Introduction to Literary Forms.

No student transferring from another college or university is eligible to receive a degree, until at least 46 quarter hours of academic work have been completed at Northeastern University immediately preceding graduation.

New Bachelor of Science

Some departments have elected to offer a new B.S. degree, the requirements for which are listed after the B.A. degree in the following pages (unless otherwise stated, the requirements are the same as for the B.A. degree).

Chemical-Biological Technology Programs

Recognizing the need for technicians and technologists in modern society, University College offers the following programs (formerly in Lincoln College):

Chemical-Biological Technology (A.S.)	page 99
Chemical-Biological Technology (B.S.)	page 100

The Associate in Science Degree

The program leading to the Associate degree is offered for those desiring a general cultural background in the liberal arts and humanities, but who do not wish to pursue a major field of concentration for the baccalaureate degree.

Candidates for the Associate in Science degree in Liberal Arts must complete a minimum of 96 quarter hours of credit. This is approximately one half of the requirements (174 quarter hours) for the Bachelor of Science degree.

To provide a balanced program which will achieve the established objectives, the faculty has set a minimum credit requirement in the several areas of study as listed under each major.

Distribution Requirements

For the purpose of satisfying the distribution requirements in all Liberal Arts Majors:

Math-Science includes only courses in Mathematics (10), Physics (11), Chemistry (12), Earth Science (16), Biology (18), and Psychology (lab. courses only) (19).

Humanities includes only courses in Art (27), Speech and Theatre Arts (29), English (except *required*) (30), Journalism (38), Modern Languages (31 to 34) (except required elementary or conversational), Philosophy (26), and Music (28).

Social Sciences includes only courses in Economics (39), History (23), Political Science (22), Psychology (except laboratory courses) (19), Social Welfare (25), and Sociology-Anthropology (20 and 21).

English Requirement

The 8 q.h. of *required* English* must be taken prior to matriculation. These are required courses which cannot be used to satisfy distribution requirements in any liberal arts course of study.

30.601, 30.602, (or 30.603) Composition and Rhetoric I, II, or (Intensive)	4 q.h.
30.604, 30.605, (or 30.606) Introduction to Literary Forms I, II (or Intensive)	4 q.h.

Honors Program

An upperclass honors program is provided in University College to enable superior students to develop their potential to the highest degree by making it possible for them to pursue studies in their major fields to greater depth than is possible in the regular courses.

The nature of the program is determined by the academic department concerned. Programs may involve any of the following elements: special research projects culminating in honor theses, seminars, reading projects, directed independent study, or creative work. Flexibility is the keynote, with every consideration given to the individual needs and requirements of the student.

Students who have earned 96 quarter hours of credit toward their Bachelor's degree and who have a grade-point average of 3.0 or better are eligible to apply to the Director of Liberal Arts in University College for admission to the program. Acceptance as an honors candidate rests with the academic department concerned.

*For new English requirements see explanation on page 209.

Acceptance of Credits by the College of Liberal Arts*

The College of Liberal Arts permits its students to enroll for credit in all courses in University College offered on a quarterly basis, when they are pertinent to the student's program and have been approved by the Dean of the College of Liberal Arts. The credits for such courses may be applied:

1. To the total number of credits needed for graduation
2. To satisfy distribution requirements
3. To fulfill language and major deficiencies

Credits from University College, as well as those from other accredited institutions, may not be applied to the quality point average of students in the College of Liberal Arts except when such credits are from courses taken as substitutes for those College of Liberal Arts courses failed by students. In such instances students must receive a grade of C or better in the University College courses and then only 2.0 quality points are applied to the student's record for each course. Courses taken in University College which are not offered in the Liberal Arts College, may be transferred with the full grade upon approval of the major department.

Transfer of Students to the College of Liberal Arts*

Those students enrolled in University College who wish to transfer to the College of Liberal Arts must apply through the Department of Admissions of the Basic Colleges.

Advanced Standing Credit—Credit for Non-Collegiate Experience (NCE)

A matriculated Liberal Arts student with a departmental major in University College may obtain up to 16 quarter hours of credit (excluding CLEP credit) for knowledge acquired in a non-traditional manner.

The student will petition his major adviser (with a copy to the Director of Admissions) for such credit, listing the Liberal Arts course(s), as well as the reasons, for which he feels he should receive credit. He may also petition for credit for subject matter which has no counterpart course in University College. The major adviser will contact the consultant of the appropriate Liberal Arts department to arrange for an appraisal of the student's credentials. At the discretion of the department, this appraisal may or may not include a formal examination. Upon receipt of the consultant's recommendation, the student may request the Director of Admissions to inform him of the status of his petition.

In order to plan their last year and to expedite the evaluation of their petition for NCE credit, students planning to graduate during a particular year are urged to submit petitions prior to June 1 of the year preceding graduation. No petitions can be considered after February 1 for June graduation or after March 1 for September graduation.

In no case will this credit be considered as partial fulfillment of the residence requirement nor will a grade be assigned.

*One of the Basic (day) Colleges of Northeastern University.

No credit will be assigned in this manner for courses which can be accredited through the CLEP testing program at the time of the petition.

Wherever possible, credit will be assigned for specific courses.

It is possible that this credit may be applicable toward a degree in University College only.

Field Work Courses

To provide the opportunity for a student to apply his academic background to practical problems, several departments have introduced courses in their curriculum entitled "Field Work in . . .".

A field work course shall have the following characteristics (as voted by the Curriculum Committee):

1. It shall be a one quarter course worth six quarter hours of credit.
2. Only matriculated majors within the department offering the course may register.
3. The prerequisites shall be departmentally established.
4. Each student shall make his own arrangement for carrying on suitable field work at a departmentally acceptable organization involving departmentally acceptable field work experience(s). The department will participate in student placement only in an advisory capacity.
5. Each student shall spend a minimum of fifteen hours per week at the outside organization on a volunteer or paid basis.
6. Each student shall meet with the departmental field work adviser as frequently as the adviser feels necessary but, in any case, no fewer than three times per quarter (once to formulate the program of field work experience, once to discuss on-going work and once to transmit and discuss the final written report.)
7. The student's grade shall be dependent upon both the quality of the experience as demonstrated in the final report and the discussions between the U.C. field work adviser and the outside supervisor.
8. So long as one student registers, the course will not be cancelled.
9. The outside supervisor will be offered a transferrable voucher for a tuition-free course at Northeastern University.

Prior to registration, each student should consult with his major department.

All field work courses will be numbered as follows: —.699

ECONOMICS**Bachelor of Arts Degree**

(Students who matriculated prior to September 1973 must petition the UC Admissions Office for this degree.)

Distribution Requirements—(see page 80 for courses included in the three categories listed below:)

			quarter hours	
		Math-Science	16	
		Humanities	24	
		Social Sciences	24	64
			—	
Liberal Arts Program Requirements				
*30.601,	30.602	(or 30.603)	Composition & Rhetoric I, II (or Intensive)	4
*30.604,	30.605	(or 30.606)	Introduction to Literary Forms I, II (or Intensive)	4
Modern Language:			Elementary or Conversational	12
			Intermediate	12
			—	32

Major Concentration Courses—required

39.507,	39.508,	39.509	Intermediate Economic Theory I, II, III	6
39.511,	39.512,	39.513	Statistics I, II, III	6
	39.517,	39.518	Money and Banking I, II	4
		39.519	Public Finance	2
		39.521	Economic Growth and Development I	2
		39.523	Government and Business I	2
		39.527	Labor Economics	2
	39.528,	39.529	International Economics I, II	4
		39.530	Comparative Economic Systems	2
	39.531,	39.532	Business Cycles I, II	4
		39.581	Economic Policy Seminar	2

The remaining twelve hours must be taken from the following courses:

		39.522	Economic Growth and Development II	2
	39.524,	39.526	Government and Business II, III	4
		39.525	American Economic History	2
		39.533	Business Cycles III	2
39.536,	39.537,	39.538	Advanced Statistics I, II, III	6
		39.539	Managerial Economics	2
		39.540	History of Economic Thought	2
		39.551	Industrial Organization	2
		39.561	Urban Economics	2
		39.571	European Economic History	2
			—	48

Elective Courses****30****Total Credits****174**

Bachelor of Science Degree
(None offered at this time.)

*These must be completed prior to matriculation.

**While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses in a variety of fields beyond the major.

ENGLISH**Bachelor of Arts Degree**

(Students who matriculated prior to September 1973 must petition the UC Admissions Office for this degree.)

Distribution Requirements—(see page 80 for courses included in the three categories listed below:)

		quarter hours	
	Math-Science	16	
	Humanities	24	
	Social Sciences	24	64
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Liberal Arts Program Requirements			
*30.601, 30.602 (or 30.603)	Composition & Rhetoric I, II (or Intensive)	4	
*30.604, 30.605 (or 30.606)	Introduction to Literary Forms I, II (or Intensive)	4	
Modern Language:	Elementary or Conversational	12	
	Intermediate	12	32
<hr/>			
Major Concentration Courses—required			
Preliminary Courses—all courses required			
30.541, 30.542, 30.543	English Literature I, II, III	6	
30.544, 30.545, 30.546	American Literature I, II, III	6	
30.517	Intermediate Writing	2	14
<hr/>			
Major Figures in English Literature—three courses required			
30.551, 30.552, 30.553	Chaucer I, II, III	6	
	30.561 Spenser	2	
30.554, 30.555, 30.556	Shakespeare I, II, III	6	
	30.562 Milton	2	6
<hr/>			
Major Periods in English Literature—six courses required			
	30.557 The 17th Century	2	
	30.558, 30.559 The 18th Century I, II	4	
30.571, 30.572, 30.573	The 19th Century I, II, III	6	
30.574, 30.575, 30.576	The 18th-Century English Novel		
	The 19th-Century English Novel		
	The 20th-Century English Novel	6	12
<hr/>			
American Literature—three courses required			
30.581, 30.582, 30.583	The American Short Story;		
	The 19th-Century American Novel		
	The 20th-Century American Novel	6	
	30.578 Afro-American Literature	2	
	30.584 Contemporary American Poetry	2	6
<hr/>			
Literature in Translation—three courses required			
30.531, 30.532, 30.533	Western World Literature I, II, III	6	
30.534, 30.535, 30.536	Western World Literature IV, V, VI	6	6
<hr/>			
English Electives			8
Open Electives			26
Total Credits			174

These may include 30.591, 30.592, 30.593 Honors Programs I, II, III

*These must be completed prior to matriculation.

ENGLISH (cont.)**Bachelor of Science Degree**

Unless otherwise stated, requirements are the same as for the B.A. degree.

Modern Language:	none
English Electives:	16 q.h.
Open Electives:	42 q.h.

FINE ARTS**Bachelor of Arts Degree**

(Students who matriculated prior to September 1973 must petition the UC Admissions Office for this degree.)

Distribution Requirements—(see page 80 for courses included in the three categories listed below:)

	quarter hours	
Math-Science	16	
Humanities	24	
Social Sciences	24	64

Liberal Arts Program Requirements

*30.601, 30.602 (or 30.603)	Composition & Rhetoric I, II (or Intensive)	4	
*30.604, 30.605 (or 30.606)	Introduction to Literary Forms I, II (or Intensive)	4	
Modern Language:	Elementary or Conversational	12	
	Intermediate	12	32

Major Concentration Courses—required

27.504, 27.505, 27.506	History of Art I, II, III	6
------------------------	---------------------------	---

In addition to History of Art I, II, III required of all Fine Arts majors, each student will select a minimum of 38 quarter hours in Area I or 39 quarter hours in Area II.

Bachelor of Science Degree

Unless otherwise stated, requirements are the same as for the B.A. degree.

Modern Language:	none
Elective Courses:	58 q.h.

(Continued on following page.)

*These must be completed prior to matriculation.

Area I—Art History Major

		27.507	Ancient Architecture	2
		27.508	Medieval and Renaissance Architecture	2
		27.509	European Architecture	2
	27.510,	57.511	Ancient Painting and Sculpture I, II	4
		27.512	Medieval Painting and Sculpture	2
		27.514	European Painting	2
	27.515,	27.516	Modern Painting I, II,	4
		27.518	20th-Century American Architecture	2
		27.519	20th-Century European Architecture	2
		27.520	Italian Renaissance Art II	2
		27.522	French Painting	2
		27.523	English Art	2
27.524,	27.525,	27.526	American Art I, II, III	6
		27.535	African Art	2
		27.536	Latin American Art	2
		27.538	Chinese Art	2
		27.539	Japanese Art	2
		27.547	European Graphic Arts	2
		27.560	Oriental Indian Art	2
27.587,	27.588,	27.589	History of Photography I, II, III	6
		27.592	New York Art Seminar	2
		27.594	European Art Seminar	2
27.597,	27.598,	27.599	History and Technique of Film I, II, III	6
27.600,	27.601,	27.602	Honors Program I, II, III	12
		27.603	Mexican Art	2

Area II—Studio Art Major**Required:**

27.541,	27.542,	27.543	Drawing I, II, III	9
27.561,	27.562,	27.563	Basic Color and Design I, II, III	9

Twenty one quarter hours must be taken from the following courses:

27.527,	27.528,	27.529	Life Drawing I, II, III	9
27.544,	27.545,	27.546	Graphic Arts I, II, III	9
27.551,	27.552,	27.553	Painting—Basic Level I, II, III	9
27.554,	27.555,	27.556	Painting—Advanced Level I, II, III	9
27.557,	27.558,	27.559	Advanced Graphic Arts I, II, III	9
		27.564	Advanced Color and Design	3
27.571,	27.572,	27.573	Basic Commercial Design I, II, III	9
		27.574	Advanced Commercial Design	3
27.600,	27.601,	27.602	Honors Program I, II, III	12

Elective Courses

44-45
34

Total Credits**174**

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses in a variety of fields beyond the major.

HISTORY**Bachelor of Arts Degree**

(Students who matriculated prior to September 1973 must petition the UC Admissions Office for this degree.)

Distribution Requirements—(see page 80 for courses included in the three categories listed below:)

	quarter hours	
Math-Science	16	
Humanities	24	
Social Sciences	24	64
	—	

Liberal Arts Program Requirements

*30.601, 30.602 (or 30.603)	Composition & Rhetoric I, II (or Intensive)	4	
*30.604, 30.605 (or 30.606)	Introduction to Literary Forms I, II (or Intensive)	4	
Modern Language:	Elementary or Conversational	12	
	Intermediate	12	32
		—	

Major Concentration Courses—required

History majors are required to take 6 quarter hours of Western Civilization (23.501, 23.502, 23.503) and 6 quarter hours of the American History survey (23.504, 23.505, 23.506). These 12 credits are applicable to the social science distribution requirements for History majors. **12**

Required in addition are 40 quarter hours of history courses to be distributed as follows:

	quarter hours
23.500 Historian's Craft	4
At least 6 quarter hours in each of the following four areas:	
I. Ancient Medieval, and Early Modern Europe	
II. Modern and Contemporary Europe	
III. American History	
IV. Other Regions	24

(See specific History courses at back of catalog for area designations.)

The remaining 12 quarter hours of history may be chosen from any of the above four areas. Students in the Honors Program (23.597, 23.598, 23.599) may use these 12 quarter hours. **12 40**

Since September, 1972 some history courses carry 4 quarter hours of credit and may meet twice weekly.

Elective Courses**	26
	—
Total Credits	174

(Continued on following page.)

*These must be completed prior to matriculation.

**While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses in a variety of fields beyond the major.

HISTORY (cont.)**Bachelor of Science Degree**

(Unless otherwise stated, requirements are the same as for the B.A. degree)

Distribution Requirements—

				quarter hours
Math-Science				None
Humanities				24
Social Sciences				None
Modern Language				None
Other required courses				30
39.501,	39.502,	39.503	Economic Princ. & Problems I, II, III	6
39.511,	39.512,	39.513	Statistics I, II, III	6
21.501,	21.502,	21.503	Sociology I, II, III	6
21.512,	21.513,	21.514	Social Research Methods I, II, III	6
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6

Elective Course—**60****LIBERAL ARTS****Associate in Science Degree**

				quarter hours
Math—Science*				16
Humanities*				24
Social Sciences*				24
30.601,	30.602	Composition and Rhetoric I, II		4
30.604,	30.605	Introduction to Literary Forms I, II		4
Electives				24
Total Credits				96

*See page 80 for courses included in the various designations.

POLITICAL SCIENCE**Bachelor of Arts Degree**

(Students who matriculated prior to September 1973 must petition the UC Admissions Office for this degree.)

Distribution Requirements—(see page 80 for courses included in the three categories listed below:)

	quarter hours	
Math-Science	16	
Humanities	24	
Social Sciences	24	64
	—	

Liberal Arts Program Requirements

*30.601, 30.602 (or 30.603)	Composition & Rhetoric I, II (or Intensive)	4	
*30.604, 30.605 (or 30.606)	Introduction to Literary Forms I, II (or Intensive)	4	
Modern Language:	Elementary or Conversational	12	
	Intermediate	12	32
		—	

Major Concentration Courses—required

Prerequisites: Principles of Political Science I, II, III (22.501, 22.502, 22.503) which may be taken out of sequence if necessary, or Principles of Political Science (Intensive) (22.507).

(Continued on following page)

Bachelor of Science Degree

(A Bachelor of Science program in which quantitative requirements are substituted for modern language will be available to Political Science Majors effective September 1974. For details on the curriculum, students are referred to the adviser to Political Science majors in the Department.)

*These must be completed prior to matriculation.

Each student will select a minimum of 6 q.h. from the following four areas, as indicated:

Area I—American Government**quarter hours**

22.511	American National Government	2
	any additional two courses from among:	4
22.512	Urban and Metropolitan Government	2
22.514	American Constitutional Law	2
22.515	Civil Rights	2
22.516	Public Administration I	2
22.517	Public Administration II	2
22.518	Government and Politics of States	2
22.551	Current Political Issues	2

Area II—Comparative Government

22.521	Comparative Government I	2
22.522	Comparative Government II	2
	any additional one course from among:	2
22.537	European Political Parties	2
22.544	Government and Politics in the Soviet Union I	2
22.545	Government and Politics in the Soviet Union II	2
22.547	Government and Politics of Communist China I	2
22.548	Government and Politics of Communist China II	2
22.552	Government and Politics of the Middle East I	2
22.553	Government and Politics of the Middle East II	2
22.555	Government and Politics in Latin America I	2
22.556	Government and Politics in Latin America II	2
22.558	Government and Politics of South East Asia	2
22.559	Government and Politics of Japan	2
22.560	Politics and Policies of Developing Nations I	2
22.561	Politics and Policies of Developing Nations II	2
22.562	Government and Politics of Sub Saharan Africa	2
22.563	Government and Politics of Northern Africa	2

Area III—International Relations

22.535	International Relations (not to be taken by students who have credit for 22.531)	4
	any additional one course from among:	2
22.532	International Organization	2
22.534	Soviet Foreign Policy	2
22.538	Communist China's Foreign Policy	2
22.541	International Law	2
22.533	American Foreign Policy	2
22.542	American Foreign Policy I	2
22.543	American Foreign Policy II	2
22.564	Communism in Eastern Europe I	2
22.565	Communism in Eastern Europe II	2

Area IV—Theory and Methodology

22.536	Introduction to Political Theory (not to be taken by students who have credit for 22.504)	4
	any additional one course from among:	2
22.505	Contemporary Political Theory	2
22.506	American Political Thought	2
22.508	Research Methods	2

Political Science Electives. A total of 18 quarter hours of elective courses from any or all of the above areas, and may include the maximum number of quarter hours credit for Honors permitted by the College.

18

Open Electives. Social Sciences other than Political Science, including not fewer than 6 quarter hours of each of three different disciplines selected from Economics, History, Psychology, and Sociology-Anthropology.

18**Other****18****Total Credits****174**

PSYCHOLOGY**Bachelor of Arts Degree**

(Students who matriculated prior to September 1973 must petition the UC Admissions Office for this degree.)

Distribution Requirements—(see page 80 for courses included in the three categories listed below:)

	quarter hours
Math-Science	16
Humanities	24
**Social Sciences	24
	64

Liberal Arts Program Requirements

*30.601, 30.602 (or 30.603)	Composition & Rhetoric I, II or (Intensive)	4	
*30.604, 30.605 (or 30.606)	Introduction to Literary Forms I, II (or Intensive)	4	
Modern Language:	Elementary or Conversational	12	
	Intermediate	12	32

(Continued on following page)

Bachelor of Science Degree

(None offered at this time.)

**It is recommended that Psychology majors substitute 19.508 and 19.509—Fundamentals of Psychology I and II for 19.501, 502, and 503.

*These must be completed prior to matriculation.

Major Concentration Courses—required

19.504,	19.505,	19.506	Statistics in Psychology I, II, III	6
19.551,	19.552,	19.533	Experimental Psychology I, II, III	9
19.561,	19.562,	19.563	Historical Development of Psychology I, II, III	6

In addition to the courses listed above, required of all Psychology majors, each student will select a minimum of 22 hours from the following courses:

19.511,	19.512	Child Psychology I, II	4	
	19.513	Adolescent Psychology	2	
19.521,	19.522	Personality I, II	4	
	19.523	Motivation	2	
19.524,	19.525	Social Psychology I, II	4	
	19.526	Psychology of Aggression	2	
	19.527	Psychology of Conformity and Rebellion	2	
	19.528	Psychological Factors in National and International Conflict	2	
	19.529	Interpersonal Behavior in the Small Group I	2	
	19.530	Interpersonal Behavior in the Small Group II	2	
	19.535	Psychological Factors in the Creative Process	2	
	19.536	Psychology of Thought	2	
	19.537	Psychology of Language	2	
		19.538	Psychology of Learning	2
19.541,	19.542,	19.543	Abnormal Psychology I, II, III	6
		19.546	Psychological Testing I	2
		19.547	Psychological Testing II	2
		19.560	Psychology of Women	2
		19.571	Seminar in Psychology	2
19.591,	19.592,	19.593	Honors Program I, II, III	8 only

Elective Courses*	35
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Total Credits	174
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*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses in a variety of fields beyond the major.

SOCIOLOGY-ANTHROPOLOGY**Bachelor of Arts Degree**

(Students who matriculated prior to September 1973 must petition the UC Admissions Office for this degree.)

Distribution Requirements—(see page 80 for courses included in the three categories listed below:)

	quarter hours
Math-Science	16
Humanities	24
Social Sciences	24
	64

Liberal Arts Program Requirements

*30.601, 30.602 (or 30.603)	Composition & Rhetoric I, II (or Intensive)	4	
*30.604, 30.605 (or 30.606)	Introduction to Literary Forms I, II (or Intensive)	4	
Modern Language:	Elementary or Conversational	12	
	Intermediate	12	32

Bachelor of Science Degree

Unless otherwise stated, requirements are the same as for the B.A. degree.

Distribution requirements—

Math-Science	none
Humanities	none
Social Sciences	24 q.h. (other than soc-anthro.)
Modern Language	none

For those anticipating work in applied social welfare, it is highly recommended that at least elementary or conversational courses in an appropriate language be mastered.)

Major Concentration Requirements

Same as for the B.A. degree plus at least 10 additional quarter hours of advanced courses, of which 4 q.h. should be in anthropology.

Electives: 78 q.h.

(Students are encouraged to elect math-science and humanities for adequate educational breadth.)

For students planning to attend graduate school, the B.A. degree is recommended.

*These must be completed prior to matriculation.

Major Concentration Courses—required				quarter hours
20.501,	20.502,	20.503	Anthropology I, II, III	6
21.501,	21.502,	21.503	Sociology I, II, III	6
21.512,	21.513,	21.514	Social Research Methods I, II, III	6
21.517,	21.518,	21.519	Social Theory I, II, III	6

The student may choose to substitute for any of the course sequences above more intensive versions under the following numbers and titles:

20.601,	20.602	Principles of Anthropology I, II	8
21.601,	21.602	Principles of Sociology I, II	8
21.612,	21.613	Social Research Methods I, II (Intensive)	8
21.617,	21.618	Social Theory I, II (Intensive)	8

The major is required to take 30 quarter hours of advanced courses from among the following offerings:

	20.521	Culture and Personality	2
	20.531	Primitive Social Organization	2
	20.532	Primitive Religion	2
	20.533	Acculturation	2
	20.537	Anthropological Theory	2
	20.541	North American Indian	2
	20.544	African Peoples and Culture	2
	20.547	Latin American Peoples and Culture	2
	20.548	Studying the Family Cross-Culturally	2
	20.549	Folklore	2
	20.550	Peasant Society and Culture as an Anthropological Problem	2
	20.551	The Comparative Study of changing Peasantries	2
	20.552	Eastern European Peasantry in the Modern World	2
	21.505	Drugs and Society	2
	21.506	Sociology of Religion	2
	21.507	Sex in Society: The Study of Sex Roles	2
	21.508	Sociology of Literature	2
	21.509	Sociology of Socialist Societies	2
	21.528	Social Stratification	2
	21.531	Social Change	2
	21.534	Social Control	2
	21.535	Political Sociology	2
	21.546	Sociology of Deviant Behavior	2
	21.547	Social Problems	2
	21.550	Juvenile Delinquency	2
21.551.	21.552	Family and Marriage I, II	4

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21.553,	21.554,	21.555	Racial and Cultural Relations I, II, III	6	
		21.556	Sociology of Poverty	2	
		21.557	Urban Sociology	2	
		21.558	Community Analysis	2	
		21.559	Seminar in Urban Studies	2	
		21.560	Medical Sociology	2	
		21.561	Sociology of Mental Health	2	
		21.563	Social Gerontology	2	
		21.567	Population	2	
		21.570	Sociology of Occupations and Professions	2	
		21.573	Sociology of Industry	2	
		21.575	Sociology of Formal Organizations	2	
21.591,	21.592,	21.593	Honors Programs I, II, III	12	54
Elective courses*					24
Total Credits					174

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses in a variety of fields beyond the major.

MUSIC**Bachelor of Arts Degree**

(Students who matriculated prior to September 1973 must petition the UC Admissions Office for this degree.)

Distribution Requirements—(see page 80 for courses included in the three categories listed below:)

	quarter hours
Math-Science	16
Humanities	24
Social Sciences	24
	64

Liberal Arts Program Requirements

*30.601, 30.602 (or 30.603)	Composition & Rhetoric I, II (or Intensive)	4	
*30.604, 30.605 (or 30.606)	Introduction to Literary Forms I, II (or Intensive)	4	
Modern Language:	Elementary or Conversational	12	
	Intermediate	12	32

Major Concentration Courses—required

28.599, 28.600, 28.601	Theory I, II, III	6	
28.605, 28.606, 28.607	Theory IV, V, VI	6	
28.608, 28.609,	Contrapuntal Techniques I, II	4	
28.534, 28.535, 28.536	Pedagogy of Music I, II, III	6	
28.602, 28.603, 28.604	Music History I, II, III	6	
28.528, 28.529, 28.530	Ear Training I, II, III	6	34

Bachelor of Science Degree

Unless otherwise stated, requirements are the same as for the B.A. degree.

Distribution Requirements —	quarter hours
Math-Science	7
Humanities	24
Social Sciences	24
Modern Language (Elementary or Conversational)	12

Electives 29

(May include Honors Program, 28.695, 28.696, 28.697)

(Continued on following page.)

*These must be completed prior to matriculation.

Major Concentration Courses—elective

Five of the following courses should be taken:

28.503	Women in Music	2	
28.510	Music and Art	2	
28.515	Contemporary Music	2	
28.517	Music as a Means of Social Expression	2	
28.520	Musical Forms	2	
28.521	The Symphony	2	
28.522	The Concerto	2	
28.523	Great Literature for Piano	2	
28.524	The World of Opera	2	
28.525	Contemporary Opera	2	
28.526	Jazz: Evolution and Essence	2	
28.531	Life and Works of J. S. Bach	2	
28.532	Life and Works of Mozart	2	
28.533	Life and Works of Beethoven	2	
28.543	Great Choral Literature	2	
28.544	Chamber Music	2	
28.545	Wagner's Ring Cycle	2	
28.546	Life and Works of Stravinsky	2	
28.547	The Music of Bruckner and Mahler	2	
28.548	Great Love Songs through the Ages	2	
28.549	A History of Musical Instruments in Western Culture	2	
28.550	Life and Works of Haydn	2	
28.551	Life and Works of Brahms	2	
28.552	Life and Works of Chopin	2	
28.553	Melodrama and the Macabre	2	
28.571	Piano Class I	2	
28.572	Piano Class II	2	Prereq. 28.571
28.573	Piano Class III	2	Prereq. 28.572
28.595	Opera Seminar	2	
28.587	Symphony Seminar	2	10

Free Electives

34

Total Credits**174**

CHEMICAL-BIOLOGICAL TECHNOLOGY**Associate in Science Degree**

The program in Chemical-Biological Technology provides the chemistry and biology foundation required by medical and industrial laboratory assistants and technicians in clinically, chemically, or biologically oriented organizations, and for persons having paramedical responsibilities. Employment opportunities are in hospitals, health clinics, research foundations, chemical and drug industries, public health organizations, water and sanitation departments; and in the emerging fields of the oceanographic technologies.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Basic Mathematics I and II courses (10.330 and 10.331). The Mathematics Placement Test must be taken prior to registration.

First Year				quarter hours
10.327,	10.328,	10.329	Mathematics I, II, III	} 6
			or	
10.307,	10.308		College Algebra & Trigonometry I, II	} 8
11.304,	11.305,	11.306	General Physics I, II, III	6
12.544,	12.545,	12.546	General Chemistry I, II, III	6
12.547,	12.548,	12.549	General Chemistry Lab. I, II, III	3
30.601,	30.602		Composition & Rhetoric I, II	4
			English Elective	2
Second Year				
10.316,	10.317,	10.318	Probability and Statistics I, II, III	} 6
			or	
10.320,	10.321,	10.322	Calculus I, II, III	} 8
			Social Science Elective I, II, III	6
18.511,	18.512,	18.513	Biology I, II, III	12
Third Year				
12.531,	12.532,	12.533	Organic Chemistry I, II, III	} 12
12.534,	12.535,	12.536	Organic Chemistry Lab. I, II, III	
			or	
12.521,	12.522,	12.523	Analytical Chemistry I, II, III	} 9
12.524,	12.525,	12.526	Analytical Chemistry Lab. I, II, III	
18.524,	18.525,	18.526	Human Anatomy and Physiology I, II, III	6
			Humanities Elective I, II, III	6
Fourth Year				
18.521,	18.522,	18.523	Microbiology I, II, III	12
			Biology or Chemistry Elective I, II, III	6
Total Credits				96-100

Note: Associate degree graduates may transfer applicable credits toward the requirements in Lincoln College programs leading to the Associate in Engineering, Associate in Science, or Bachelor of Engineering Technology degrees, as well as University College programs.

CHEMICAL-BIOLOGICAL TECHNOLOGY**Bachelor of Science Degree**

The Chemical-Biological Technology program is an interdisciplinary program integrating theoretical and laboratory course sequences from the fields of chemistry and biology which prepare the student to assume responsibilities in laboratory careers which emphasize laboratory application and teaching careers in general science. Employment opportunities are in a wide variety of industrial, pharmaceutical, clinical, and hospital laboratories dealing with analytical, production, and research functions and in secondary school education in the teaching of general science, chemistry, biology, and other related courses.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Basic Mathematics I and II courses (10.330 and 10.331). The Mathematics Placement Test must be taken prior to registration.

First Year				quarter	hours
10.316,	10.317,	10.318	Probability and Statistics I, II, III	}	6
			or		
10.307,	10.308		College Algebra & Trigonometry I, II	}	8
11.304,	11.305,	11.306	General Physics, I, II, III		6
12.544,	12.545,	12.546	General Chemistry I, II, III		6
12.547,	12.548,	12.549	General Chemistry Lab. I, II, III		3
30.601,	30.602		Composition and Rhetoric I, II		4
			English Elective		2
Second Year					
10.316,	10.317,	10.318	Probability and Statistics I, II, III	}	6
			or		
10.320,	10.321,	10.322	Calculus I, II, III	}	8
18.511,	18.512,	18.513	Biology I, II, III		12
23.501,	23.502,	23.503	Western Civilization I, II, III		6
Third Year					
12.521,	12.522,	12.523	Analytical Chemistry I, II, III		6
12.524,	12.525,	12.526	Analytical Chemistry Lab. I, II, III		6
18.524,	18.525,	18.526	Human Anatomy and Physiology I, II, III		9
19.501,	19.502,	19.503	Psychology I, II, III		6
Fourth Year					
12.531,	12.532,	12.533	Organic Chemistry I, II, III		6
12.534,	12.535,	12.536	Organic Chemistry Lab. I, II, III		6
18.521,	18.522,	18.523	Microbiology I, II, III		12
Fifth Year					
18.551,	18.552,	18.553	Histology-Organology I, II, III		6
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III		6
12.551,	12.552,	12.553	Instrumental and Radiochemistry I, II, III		6
16.531,	16.532,	16.533	Oceanography I, II, III		6

Sixth Year

18.561,	18.562,	18.563	Ecology I, II, III	6
12.541,	12.542,	12.543	Physical Chemistry I, II, III	6
			or	
12.515,	12.516,	12.517	Biochemistry I, II, III	6
21.501,	21.502,	21.503	Sociology I, II, III	6
			*Elective	6

Seventh Year

	18.557,	18.558	Genetics I, II	4
	18.556		Genetics Laboratory	2
30.604,	30.605		Introduction to Literary Forms I, II	4
			English Elective	2
			*Electives as needed to complete	
			Total Credits	

Total Credits**174**

*General Science Teacher Option — Students planning to apply to the Northeastern University Graduate School of Education must include courses in Adolescent Psychology and Principles of Teaching among the electives.

law enforcement

Timothy F. Moran, Associate Dean
Director, Law Enforcement Programs
Telephone 437-3324

Aims

Law Enforcement programs of study are offered to meet the needs of present and potential practitioners in the fields of corrections, law enforcement, and security who wish to acquire a liberal education as well as a professional competence, or to gain recognition for development and attainment while pursuing a career in that profession.

Methods

The distribution requirements, including certain required courses, are shown with each curriculum. Upon petition, students may be permitted under certain circumstances to substitute other courses which will more adequately serve their specific objectives.

To provide a balanced program which will achieve the established objectives, the faculty has set minimum requirements in the areas of study outlined on the following pages, with a recommended sequence of courses for each program.

Bachelor of Science Degree Program

Major fields of study are offered in Correctional Practices, Law Enforcement, and Security. Students should choose their major field of study and their electives in consultation with a program adviser.

Each curriculum provides for not less than 174 quarter hours of work, including at least 60 quarter hours of advanced work in a major field.

No student transferring from another college or university is eligible to receive a degree until at least 46 quarter hours of academic work have been completed at Northeastern University immediately preceding graduation.

Associate in Science Degree Program

The program leading to the associate degree is offered for those who wish to obtain a general background in correctional practices, law enforcement, or security, but do not wish to pursue a major field of concentration for the baccalaureate degree.

Candidates for the Associate in Science degree must complete a minimum of 96 quarter hours of credit. This is approximately one half of the requirements for the Bachelor of Science degree, and includes at least 40 quarter hours of work in a major field.

Honors Program

*The Honors Program in the field of law enforcement is designed to provide qualified students with the opportunity to achieve a broader and deeper intellectual academic experience within their chosen fields: corrections, law enforcement or security.

In general, the Honors Program consists of the following areas: independent study, directed reading seminar, independent research projects, and special seminars.

The particular academic structure of a student's Honors Program will be arranged in consultation with the Program Director and the Honors Faculty Committee, to direct the student's program.

The Honors Program is open to all matriculated Law Enforcement Program students in University College, who have obtained an associate degree or equivalent, and a minimum cumulative grade point average of 3.0. Students who are eligible for this program may apply for admission and approval, to the Director of Law Enforcement Programs.

Advanced Standing Credit—Credit for Non-Collegiate Experience (NCE)

A matriculated University College student with a department major in Corrections, Law Enforcement, or Security, may obtain up to 16 quarter hours of credit (excluding CLEP), by petitioning to take a comprehensive examination in the specific subject area based upon the student's knowledge acquired in a non-traditional manner. Petitions for these examinations may be obtained in 102 Churchill Hall or 200 Churchill Hall.

In no case will this credit be considered as partial fulfillment of the residence requirement nor will a letter grade be assigned.

No credit will be assigned in this manner for courses which can be accredited through the CLEP Testing Program at the time of the petition. Credit will only be assigned to specific courses. It is possible that this credit may be applicable toward a degree in University College only.

Course Sequence

The course sequence as listed is merely a frame of reference, a suggested guide to assist students in arranging their program. Students who wish to add a fifth course each quarter to this sequence may do so without approval of the department.

Intensive Courses

Many courses are frequently offered as single quarter intensives during the regular school year. Please refer to the listing of courses on page 283.

Intensive courses offer the opportunity for a student to achieve his objective in a shorter period of time, i.e., a student could reasonably earn a B.S. degree in five years, and an associate degree in three years.

*For course numbers see page 272.

CORRECTIONAL PRACTICES

Bachelor of Science Degree

Basic Courses—required

				quarter hours	
**10.327,	10.328,	10.329	Mathematics I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
23.501,	23.502,	23.503	Western Civilization I, II, III	6	
	*30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	32

Core Courses—required

	19.524,	19.525	Social Psychology I, II	4	
19.541,	19.542,	19.543	Abnormal Psychology I, II, III	6	
21.501,	21.502,	21.503	Sociology I, II, III	6	
		21.534	Social Control	2	
		21.547	Social Problems	2	
	21.553,	21.554	Racial and Cultural Relations I, II	4	
		21.557	Urban Sociology	2	
22.501,	22.502,	22.503	Principles of Political Science I, II, III	6	
		22.514	American Constitutional Law	2	
		22.515	Civil Rights	2	
	22.516,	22.517	Public Administration I, II	4	
23.504,	23.505,	23.506	American History I, II, III	6	
	45.511,	45.512	Human Relations in Personnel I, II	4	50

*For new English requirements see explanation on page 209.

**94.601, 602, 603, L. E. Mathematics I, II, III may be taken in place of 10.327, 328, 329.

Major Concentration Courses—Required

	94.505	Human Rights in Corrections	2	
	94.506	Basic Statistics in Law Enforcement	2	
	94.507	Correctional Counseling	2	
94.517, 94.518,	94.519	Advanced Correctional Practices I, II, III	6	
	94.523	The Law and Institutional Treatment	2	
	94.524	Comparative Correctional Systems	2	
94.525,	94.526	Law Enforcement Identification and Records I, II	4	
	94.532	Research Methods in Criminal Justice	2	
	94.544	The American Correctional System	2	
94.546,	94.547	Social Deviance I, II	4	
94.549,	94.550	Treatment of Offenders I, II	4	
94.551,	94.552, 94.553	Correctional Administration I, II, III	6	
94.563,	94.564	Criminology I, II	4	
	94.565	Delinquency Prevention	2	
94.567,	94.568	Probation and Parole Practices I, II	4	
94.574,	94.575	Juvenile Corrections I, II	4	
	94.593	Seminar in Correctional Practices	2	
94.627,	94.628	Administration of Justice I, II	4	
94.631,	94.632	Criminal Law I, II	4	
94.633,	94.634	Evidence and Court Procedure I, II	4	66

Elective Courses***26****Total Credits****174**

*For suggested electives and additional department offerings, see page 122. While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses from any other curricula in the University College Catalog.

CORRECTIONAL PRACTICES**Recommended Course Sequence for the 7-year Program
Leading to the Bachelor of Science Degree**

All new students should discuss their program with a program adviser before attempting to undertake the following sequence of courses:

	Quarter 1	Quarter 2	Quarter 3
1st Year	30.601 *Comp. & Rhet. I 94.627 Admin. of Justice I 94.631 Criminal Law I 94.633 Evid. & Ct. Proc. I	30.602 Comp. & Rhet. II 94.628 Admin. of Justice II 94.632 Criminal Law II 94.634 Evid. & Ct. Proc. II	94.505 Human Rts. in Corr. 94.544 Amer. Corr. System 94.523 Law & Inst. Treat. Elective
2nd Year	19.501 Psychology I 94.546 Soc. Deviance I 94.567 Prob. & Par. Prac. I 94.574 Juvenile Corr. I	19.502 Psychology II 94.547 Soc. Deviance II 94.568 Prob. & Par. Prac. II 94.575 Juvenile Corr. II	19.503 Psychology III Elective Elective 94.507 Corr. Counseling
3rd Year	21.501 Sociology I 94.549 Treat. Offenders I 19.541 Abnorm. Psych. I 22.514 Amer. Const. Law	21.502 Sociology II 94.550 Treat. Offenders II 19.542 Abnorm. Psych. II 22.515 Civil Rights	21.503 Sociology III 94.506 Basic Stats. in L. E. 19.543 Abnorm. Psych. III 94.532 Res. Meth. Crim. Just.
4th Year	94.563 Criminology I 21.553 Rac. & Cul. Rel. I 94.551 Corr. Admin. I 23.504 Amer. Hist. I	94.564 Criminology II 21.554 Rac. & Cul. Rel. II 94.552 Corr. Admin. II 23.505 Amer. Hist. II	94.565 Del. Prevention 21.557 Urban Sociology 94.553 Corr. Admin. III 23.506 Amer. Hist. III

*For new English requirements see explanation on page 209.

5th Year	30.604	30.605	Elective
	Intro. to Lit. Forms I	Intro. to Lit. Forms II	
	94.525	94.526	Elective
	Law Enf. Id. & Rec. I	Law Enf. Id. & Rec. II	
	22.501	22.502	22.503
	Prin. Polit. Sci. I	Prin. Polit. Sci. II	Prin. Polit. Sci. III
	45.511	45.512	Elective
	Hum. Rel. in Pers. I	Hum. Rel. in Pers. II	
6th Year	94.517	94.518	94.519
	Adv. Corr. Prac. I	Adv. Corr. Prac. II	Adv. Corr. Prac. III
	39.501	39.502	39.503
	Ec. Prin. & Prob. I	Ec. Prin. & Prob. II	Ec. Prin. & Prob. III
	23.501	23.502	23.503
	Western Civ. I	Western Civ. II	Western Civ. III
	19.524	19.525	Elective
	Soc. Psych. I	Soc. Psych. II	
7th Year	10.327	10.328	10.329
	Mathematics I	Mathematics II	Mathematics III
	22.516	22.517	94.524
	Public Admin. I	Public Admin. II	Comp. Corr. " Systems
	21.534	21.547	Elective
	Social Control	Social Problems	
	94.593	Elective	Elective
	Sem. Corr. Pract.		
		Elective	Elective

CORRECTIONAL PRACTICES**Associate in Science Degree****Basic Courses—required**

				quarter	hours
19.501,	19.502,	19.503	Psychology I, II, III	6	
	**30.601,	30.602	Composition and Rhetoric I, II	4	10

Core Courses—required

19.541,	19.542,	19.543	Abnormal Psychology I, II, III	6	
21.501,	21.502,	21.503	Sociology I, II, III	6	
	21.553,	21.554	Racial and Cultural Relations I, II	4	
		21.557	Urban Sociology	2	
		22.514	American Constitutional Law	2	
		22.515	Civil Rights	2	22

Major Concentration Courses—required

		94.505	Human Rights in Corrections	2	
		94.506	Basic Statistics in Law Enforcement	2	
		94.507	Correctional Counseling	2	
		94.523	The Law and Institutional Treatment	2	
		94.532	Research Methods in Criminal Justice	2	
		94.544	The American Correctional System	2	
	94.546,	94.547	Social Deviance I, II	4	
	94.549,	94.550	Treatment of Offenders I, II	4	
94.551,	94.552,	94.553	Correctional Administration I, II, III	6	
	94.563,	94.564	Criminology I, II	4	
		94.565	Delinquency Prevention	2	
	94.567,	94.568	Probation and Parole Practices I, II	4	
	94.574,	94.575	Juvenile Corrections I, II	4	
	94.627,	94.628	Administration of Justice I, II	4	
	94.631,	94.632	Criminal Law I, II	4	
	94.633,	94.634	Evidence and Court Procedure I, II	4	52

Elective Courses***12****Total Credits****96**

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses from any other curricula in the University College Catalog. For suggested electives and additional offerings see page 122.

**For new English requirements see explanation on page 209.

CORRECTIONAL PRACTICES**Recommended Course Sequence for the 4-Year Program
Leading to the Associate in Science Degree**

All new students should discuss their program with an adviser before undertaking the following sequence of courses:

	Quarter 1	Quarter 2	Quarter 3
1st Year	30.601 Comp. & Rhet. I 94.627 Admin. of Justice I 94.631 Criminal Law I 94.633 Evid. & Ct. Proc. I	30.602 Comp. & Rhet. II 94.628 Admin. of Justice II 94.632 Criminal Law II 94.634 Evid. & Ct. Proc. II	94.505 Human Rts. in Corr. 94.544 Amer. Corr. Sys. 94.523 Law & Inst. Treat. Elective
2nd Year	19.501 Psychology I 94.546 Soc. Deviance I 94.567 Prob. & Par. Prac. I 94.574 Juvenile Corr. I	19.502 Psychology II 94.547 Soc. Deviance II 94.568 Prob. & Par. Prac. II 94.575 Juvenile Corr. II	19.503 Psychology III Elective Elective 94.507 Corr. Counseling
3rd Year	21.501 Sociology I 94.549 Treat. Offenders I 19.541 Abnorm. Psych. I 22.514 Amer. Const. Law	21.502 Sociology II 94.550 Treat. Offenders II 19.542 Abnorm. Psych. II 22.515 Civil Rights	21.503 Sociology III 94.506 Basic Stats. in L. E. 19.543 Abnorm. Psych. III 94.532 Res. Meth. Crim. Just.
4th Year	94.563 Criminology I 21.553 Rac. & Cul. Rel. I 94.551 Corr. Admin. I Elective	94.564 Criminology II 21.554 Rac. & Cul. Rel. II 94.552 Corr. Admin. II Elective	94.565 Del. Prevention 21.557 Urban Sociology 94.553 Corr. Admin. III Elective

LAW ENFORCEMENT**Bachelor of Science Degree****Basic Courses—required****quarter hours**

**10.327,	10.328,	10.329	Mathematics I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
23.501,	23.502,	23.503	Western Civilization I, II, III	6	
	*30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	32

Core Courses—required

	19.524,	19.525	Social Psychology I, II	4	
19.541,	19.542,	19.543	Abnormal Psychology I, II, III	6	
21.501,	21.502,	21.503	Sociology I, II, III	6	
		21.534	Social Control	2	
		21.547	Social Problems	2	
22.501,	22.502,	22.503	Principles of Political Science I, II, III	6	
		22.514	American Constitutional Law	2	
		22.515	Civil Rights	2	
	22.516,	22.517	Public Administration I, II	4	
23.504,	23.505,	23.506	American History I, II, III	6	
26.531,	26.532,	26.533	Ethics I, II, III	6	
		26.534	Logic	2	
29.501,	29.502,	29.503	Effective Speaking I, II, III	6	54

*For new English requirements see explanation on page 209.

**94.601, 602, 603, L. E. Mathematics I, II, III, may be taken in place of 10.327, 10.328, 10.329.

Major Concentration Courses—required			quarter hours
	94.506	Basic Statistics in Law Enforcement	2
94.508,	94.509	Criminal Investigation and Case Preparation I, II	4
	94.512	Comparative Police Systems	2
94.514,	94.515	Interviews and Interrogations I, II	4
94.520,	94.521	Traffic Safety & Control I, II	4
94.525,	94.526	Law Enforcement Identification and Records I, II	4
	94.530	Police Public Relations	2
	94.531	Police Community Relations	2
	94.532	Research Methods in Criminal Justice	2
94.536,	94.537	The Patrol Function I, II	4
94.541,	94.542	Introduction to Criminalistics I, II	4
94.546,	94.547	Social Deviance I, II	4
	94.557	Investigative Report Writing	2
	94.560	Police Supervision	2
	94.561	Police Work with Juveniles	2
94.563,	94.564	Criminology I, II	4
	94.565	Delinquency Prevention	2
94.571,	94.572	Law Enforcement Management and Planning I, II	4
94.621,	94.622	Civil Liberties and the Police I, II	4
94.627,	94.628	Administration of Justice I, II	4
94.629,	94.630	Civil Law in Criminal Justice I, II	4
94.631,	94.632	Criminal Law I, II	4
94.633,	94.634	Evidence and Court Procedure I, II	4
			<hr/> 74
Elective Courses*			14
			<hr/>
Total Credits			174

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses from any other curricula in the University College Catalog. For suggested electives and additional department offerings, see page 122.

LAW ENFORCEMENT

**Recommended Course Sequence for the 7-Year Program
Leading to the Bachelor of Science Degree**

All new students should discuss their program with an adviser before undertaking the following sequence of courses:

	Quarter 1	Quarter 2	Quarter 3
1st Year	30.601 Comp. & Rhet. I 94.627 Admin. of Justice I 94.631 Criminal Law I 94.633 Evid. & Ct. Proc. I	30.602 Comp. & Rhet. II 94.628 Admin. of Justice II 94.632 Criminal Law II 94.634 Evid. & Ct. Proc. II	26.534 Logic 94.530 Police Public Rel. 22.514 Const. Law 22.515 Civil Rights
2nd Year	21.501 Sociology I 94.536 Patrol Funct. I 94.541 Int. Criminalist. I 94.514 Interv. & Interr. I	21.502 Sociology II 94.537 Patrol Funct. II 94.542 Int. Criminalist. II 94.515 Interv. & Interr. II	21.503 Sociology III 94.560 Police Supervision Elective Elective
3rd Year	19.501 Psychology I 94.546 Social Deviance I 94.508 Cr. Inv. Case Prep. I 94.629 Civ. Law Crim. Just. I	19.502 Psychology II 94.547 Social Deviance II 94.509 Cr. Inv. Case Prep. II 94.630 Civ. Law Crim. Just. II	19.503 Psychology III 21.547 Social Problems 94.557 Inv. Report Writing 94.532 Res. Meth. Crim. Just.
4th Year	94.563 Criminology I 19.541 Abnorm. Psych. I 94.520 Traf. Sfty. & Cont. I 94.621 Civ. Lib. & Police I	94.564 Criminology II 19.542 Abnorm. Psych. II 94.521 Traf. Sfty. & Cont. II 94.622 Civ. Lib. & Police II	94.565 Del. Prevention 19.543 Abnorm. Psych. III 94.512 Comp. Pol. Systems 94.561 Pol. Work w/Juv.

5th Year	26.531 Ethics I	26.532 Ethics II	26.533 Ethics III
	23.504 Amer. History I	23.505 Amer. History II	23.506 Amer. History III
	94.571 Law Enf. Mgt. & Pl. I	94.572 Law Enf. Mgt. & Pl. II	94.506 Basic Stat. in Law Enf.
	30.604 Intro. to Lit. Forms I	30.605 Intro. to Lit. Forms II	94.531 Police Comm. Rel.
6th Year	10.327 Mathematics I	10.328 Mathematics II	10.329 Mathematics III
	22.501 Prin. Polit. Sci. I	22.502 Prin. Polit. Sci. II	22.503 Prin. Polit. Sci. III
	94.525 Law Enf. Id. & Rec. I	94.526 Law Enf. Id. & Rec. II	Elective
	19.524 Soc. Psych. I	19.525 Soc. Psych. II	21.534 Social Control
7th Year	39.501 Ec. Prin. & Prob. I	39.502 Ec. Prin. & Prob. II	39.503 Ec. Prin. & Prob. III
	23.501 Western Civ. I	23.502 Western Civ. II	23.503 Western Civ. III
	29.501 Effec. Spkg. I	29.502 Effec. Spkg. II	29.503 Effec. Spkg. III
	22.516 Public Admin. I	22.517 Public Admin. II	Elective

LAW ENFORCEMENT**Associate in Science Degree****Basic Courses—required**

				quarter hours	
19.501,	19.502,	19.503	Psychology I, II, III	6	
**30.601,	30.602		Composition and Rhetoric I, II	4	10

Core Courses—required

19.541,	19.542,	19.543	Abnormal Psychology I, II, III	6	
21.501,	21.502,	21.503	Sociology I, II, III	6	
		22.514	American Constitutional Law	2	
		22.515	Civil Rights	2	
		26.534	Logic	2	18

Major Concentration Courses—required

94.508,	94.509	Criminal Investigation and Case Preparation I, II	4	
94.514,	94.515	Interviews and Interrogations I, II	4	
94.520,	94.521	Traffic Safety & Control I, II	4	
	94.530	Police Public Relations	2	
	94.531	Police Community Relations	2	
	94.532	Research Methods in Criminal Justice	2	
94.536,	94.537	The Patrol Function I, II	4	
94.541,	94.542	Introduction to Criminalistics I, II	4	
94.546,	94.547	Social Deviance I, II	4	
	94.557	Investigative Report Writing	2	
	94.560	Police Supervision	2	
	94.561	Police Work with Juveniles	2	
94.563,	94.564	Criminology I, II	4	
	94.565	Delinquency Prevention	2	
94.627,	94.628	Administration of Justice I, II	4	
94.629,	94.630	Civil Law in Criminal Justice I, II	4	
94.631,	94.632	Criminal Law I, II	4	
94.633,	94.634	Evidence and Court Procedure I, II	4	58

Elective Courses*

10

Total Credits

96

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses from any other curricula in the University College Catalog. For suggested electives and additional department offerings, see page 122.

**For new English requirements see explanation on page 209.

LAW ENFORCEMENT**Recommended Course Sequence for the 4-Year Program
Leading to the Associate in Science Degree**

All new students should discuss their program with their program adviser before undertaking the following sequence of courses.

	Quarter 1	Quarter 2	Quarter 3
1st Year	30.601 Comp. & Rhet. I 94.627 Admin. of Justice I 94.631 Criminal Law I 94.633 Evid. & Ct. Proc. I	30.602 Comp. & Rhet. II 94.628 Admin. of Justice II 94.632 Criminal Law II 94.634 Evid. & Ct. Proc. II	26.534 Logic 94.530 Police Public Rel. 22.514 Const. Law 22.515 Civil Rights
2nd Year	21.501 Sociology I 94.536 Patrol Funct. I 94.541 Int. Criminalist. I 94.514 Interv. & Interr. I	21.502 Sociology II 94.537 Patrol Funct. II 94.542 Int. Criminalist. II 94.515 Interv. & Interr. II	21.503 Sociology III 94.560 Police Supervision Elective Elective
3rd Year	19.501 Psychology I 94.546 Social Deviance I 94.508 Cr. Inv. & Case Prep. I 94.629 Civ. Law Crim. Just. I	19.502 Psychology II 94.547 Social Deviance II 94.509 Cr. Inv. & Case Prep. II 94.630 Civ. Law Crim. Just. II	19.503 Psychology III 94.561 Pol. Work w/Juv. 94.557 Inv. Report Writing 94.532 Res. Meth. Crim. Just.
4th Year	94.563 Criminology I 19.541 Abnorm. Psych. I 94.520 Traf. Sfty. & Cont. I Elective	94.564 Criminology II 19.542 Abnorm. Psych. II 94.521 Traf. Sfty. & Cont. II Elective	94.565 Del. Prevention 19.543 Abnorm. Psych. III 94.512 Comp. Pol. Systems Elective

SECURITY**Bachelor of Science Degree****Basic Courses—required**

quarter hours

**10.327,	10.328,	10.329	Mathematics I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
23.501,	23.502,	23.503	Western Civilization I, II, III	6	
	*30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	32

Core Course—required

19.532,	19.533,	19.534	Industrial Psychology I, II, III	6	
21.501,	21.502,	21.503	Sociology I, II, III	6	
		22.514	American Constitutional Law	2	
		22.515	Civil Rights	2	
	22.516,	22.517	Public Administration I, II	4	
41.501,	41.502,	41.503	Accounting Principles I, II, III	6	
44.501,	44.502,	44.503	Principles of Finance, Principles of Investments, Principles of Insurance and Risk Management	6	
44.514,	44.515,	44.516	Property and Casualty Insurance I, II, III	6	
		45.510	Labor Management Relations	2	
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6	
		45.620	Industrial Safety	2	48

*For new English requirements see explanation on page 209.

**94.601, 94.602, 94.603, L. E. Math I, II, III, may be taken in place of 10.327, 10.328, 10.329.

Major Concentration Courses—required

94.508,	94.509	Criminal Investigation and Case Preparation I, II	4	
	94.513	Introduction to Industrial Security	2	
94.514,	94.515	Interviews and Interrogations I, II	4	
	94.516	Security Administration	2	
94.525,	94.526	Law Enforcement Identification and Records I, II	4	
94.536,	94.537	The Patrol Function I, II	4	
94.541,	94.542	Introduction to Criminalistics I, II	4	
	94.557	Investigative Report Writing	2	
94.563,	94.564	Criminology I, II	4	
	94.565	Delinquency Prevention	2	
94.571,	94.572	Law Enforcement Management and Planning I, II	4	
94.577,	94.578,	94.579	Government Security Programs I, II, III	6
		94.582	Document Control	2
		94.583	Industrial Fire Prevention	2
94.584,	94.585	Physical Security I, II	4	
	94.586	Retail Security	2	
	94.587	Bank Security Measures	2	
	94.591	Seminar in Security	2	
94.627,	94.628	Administration of Justice I, II	4	
94.629,	94.630	Civil Law in Criminal Justice I, II	4	
94.631,	94.632	Criminal Law I, II	4	
94.633,	94.634	Evidence and Court Procedure I, II	4	72

Elective Courses*

22

174

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses from any other curricula in the University College Catalog. For suggested electives and additional department offerings, see page 122.

Recommended Course Sequence for the 7-year Program Leading to the Bachelor of Science Degree

All new students should discuss their program with their program adviser before undertaking the following sequence of courses:

	Quarter 1	Quarter 2	Quarter 3
1st Year	30.601 Comp. & Rhet. I 94.627 Admin. of Justice I 94.631 Criminal Law I 94.633 Evid. & Ct. Proc. I	30.602 Comp. & Rhet. II 94.628 Admin. of Justice II 94.632 Criminal Law II 94.634 Evid. & Ct. Proc. II	94.513 Intro. Indust. Sec. 94.586 Retail Security Elective Elective
2nd Year	94.514 Interv. & Interr. I 19.501 Psychology I 94.536 Patrol Funct. I 94.584 Phys. Security I	94.515 Interv. & Interr. II 19.502 Psychology II 94.537 Patrol Funct. II 94.585 Phys. Security II	Elective 19.503 Psychology III 94.583 Indust. Fire Prev. 94.516 Security Admin.
3rd Year	21.501 Sociology I 94.508 Cr. Inv. & Case Prep. I 19.532 Int. Indust. Psy. I 94.629 Civ. Law in Crim. Just. I	21.502 Sociology II 94.509 Cr. Inv. & Case Prep. II 19.533 Int. Indust. Psy. II 94.630 Civ. Law in Crim. Just. II	21.503 Sociology III 94.557 Invest. Report Writing 19.534 Int. Indust. Psy. III Elective
4th Year	94.563 Criminology I 45.570 Elec. Data Proc. I 94.577 Gov. Sec. Prog. I 22.514 Amer. Const. Law	94.564 Criminology II 45.571 Elec. Data Proc. II 94.578 Gov. Sec. Prog. II 22.515 Civil Rights	94.565 Del. Prevention 45.572 Elec. Data Proc. III 94.579 Gov. Sec. Prog. III Elective

5th Year	30.604 Intro. to Lit. Forms I	30.605 Intro. to Lit. Forms II	Elective
	23.501 Western Civ. I	23.502 Western Civ. II	23.503 Western Civ. III
	94.541 Int. Criminalist. I	94.542 Int. Criminalist. II	94.582 Document Control
	94.571 Law Enf. Mgt. & Plan. I	94.572 Law Enf. Mgt. & Plan II	45.510 Labor Mgt. Rel. I
			Elective
6th Year	39.501 Ec. Prin. & Prob. I	39.502 Ec. Prin. & Prob. II	39.503 Ec. Prin. & Prob. III
	41.501 Acctg. Prin. I	41.502 Acctg. Prin. II	41.503 Acctg. Prin. III
	94.525 Law Enf. Id. & Rec. I	94.526 Law Enf. Id. & Rec. II	Elective
	44.501 Prin. of Finance	44.502 Prin. of Invest.	44.503 Prin. of Ins. & Risk Mgmt.
			Elective
7th Year	10.327 Mathematics I	10.328 Mathematics II	10.329 Mathematics III
	44.514 Prop. & Cas. Ins. I	44.515 Prop. & Cas. Ins. II	44.516 Prop. & Cas. Ins. III
	94.587 Bank Sec. Meas.	45.620 Indust. Safety I	94.591 Sem. In Security
	22.516 Public Admin. I	22.517 Public Admin. II	Elective

SECURITY**Associate in Science Degree**

quarter hours

Basic Courses—required

19.501,	19.502,	19.503	Psychology I, II, III	6	
**30.601,	30.602		Composition and Rhetoric I, II	4	10

Core Courses—required

19.532,	19.533,	19.534	Industrial Psychology I, II, III	6	
21.501,	21.502,	21.503	Sociology I, II, III	6	
		22.514	American Constitutional Law	2	
		22.515	Civil Rights	2	
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6	22

Major Concentration Courses—required

	94.508,	94.509	Criminal Investigation and Case Preparation I, II	4	
		94.513	Introduction to Industrial Security	2	
	94.514,	94.515	Interviews and Interrogations I, II	4	
		94.516	Security Administration	2	
	94.536,	94.537	The Patrol Function I, II	4	
		94.557	Investigative Report Writing	2	
	94.563,	94.564	Criminology I, II	4	
		94.565	Delinquency Prevention	2	
94.577,	94.578,	94.579	Government Security Programs I, II, III	6	
		94.583	Industrial Fire Prevention	2	
	94.584,	94.585	Physical Security I, II	4	
		94.586	Retail Security	2	
	94.627,	94.628	Administration of Justice I, II	4	
	94.629,	94.630	Civil Law in Criminal Justice I, II	4	
	94.631,	94.632	Criminal Law I, II	4	
	94.633,	94.634	Evidence and Court Procedure I, II	4	54

Elective Courses*

10

Total Credits

96

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses from any other curricula in the University College Catalog. For suggested electives and additional department offerings, see page 122.

**For new English requirements see explanation on page 209.

SECURITY

**Recommended Course Sequence for the 4-Year Program
Leading to the Associate in Science Degree**

All new students should discuss their programs with an adviser before undertaking the following sequence of courses:

	Quarter I	Quarter 2	Quarter 3
1st Year	30.601 Comp. & Rhet. I 94.627 Admin. of Justice I 94.631 Criminal Law I 94.633 Evid. & Ct. Proc. I	30.602 Comp. & Rhet. II 94.628 Admin. of Justice II 94.632 Criminal Law II 94.634 Evid. & Ct. Proc. II	94.513 Intro. Indust. Sec. 94.586 Retail Security Elective Elective
2nd Year	94.514 Interv. & Interr. I 19.501 Psychology I 94.536 Patrol Funct. I 94.584 Phys. Security I	94.515 Interv. & Interr. II 19.502 Psychology II 94.537 Patrol Funct. II 94.585 Phys. Security II	Elective 19.503 Psychology III 94.583 Indust. Fire Prev. 94.516 Security Admin.
3rd Year	21.501 Sociology I 94.508 Cr. Inv. & Case Prep. I 19.532 Int. Indust. Psy. I 94.629 Civ. Law in Crim. Just. I	21.502 Sociology II 94.509 Cr. Inv. & Case Prep. II 19.533 Int. Indust. Psy. II 94.630 Civ. Law in Crim. Just. II	21.503 Sociology III 94.557 Invest. Report Writing 19.534 Int. Indust. Psy. III Elective
4th Year	94.563 Criminology I 45.570 Elect. Data Proc. I 94.577 Gov. Sec. Prog. I 22.514 Amer. Const. Law	94.564 Criminology II 45.571 Elect. Data Proc. II 94.578 Gov. Sec. Prog. II 22.515 Civil Rights	94.565 Del. Prevention 45.572 Elect. Data Proc. III 94.579 Gov. Sec. Prog. III Elective

SUGGESTED ELECTIVES AND ADDITIONAL DEPARTMENT OFFERINGS**Suggested Electives***

94.595	The National Law Enforcement Seminar	3
94.596	Hospital Security	2
94.614	Seminar in Law Enforcement: Interviewing Practicum	2
94.619	Seminar in Law Enforcement: Forensic Laboratory	2
94.617	Seminar in Law Enforcement: Criminal Behavior	2
94.624	Seminar in Law Enforcement: Executive Development	2
94.626	Seminar in Law Enforcement: Data Processing	2
32.509	Conversational Spanish I	3
32.510	Conversational Spanish II	3
32.511	Conversational Spanish III	3

Additional Department Offerings

94.604	Seminar in Law Enforcement: Youth Crime Control	2
94.605	Seminar in Law Enforcement: Victimology	2
94.606	Seminar in Law Enforcement: International Crime Control	2
94.607	Seminar in Law Enforcement: Grantmanship	2
94.608	Seminar in Law Enforcement: Law Enforcement Operational Intelligence	2
94.609	Independent Studies	2
94.610	Seminar in Law Enforcement: Collective Bargaining	2
94.611	Man, Law, and Society I	2
94.612	Man, Law, and Society II	2
94.613	Man, Law, and Society III	2
94.615	Seminar in Law Enforcement: Organized Crime	2
94.616	Seminar in Law Enforcement: Minorities and the Urban Crisis	2
94.618	Seminar in Law Enforcement: Prosecutive Development	2
94.620	Seminar in Law Enforcement: Intervention, Strategies, and Tactics for Law Enforcement (Counseling Techniques)	2
94.623	Seminar in Law Enforcement: Drugs	2
94.625	Seminar in Law Enforcement: Mental Health and the Police	2
94.650	Fire Investigation and Arson I	2
94.651	Fire Investigation and Arson II	2
94.658	Alcohol Problems in Law Enforcement	2
94.652	Law Enforcement Fiscal Management	2
94.653	Massachusetts Criminal Law	2

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses from any other curricula in the University College catalog.

health professions programs

Helene A. Loux, Associate Dean
Director, Health Professions Programs
Telephone 437-3321

Aims

Programs in Health Sciences are offered through University College in order to help mature students improve their educational preparation for advancement and service in hospitals and other health agencies through part-time study.

In addition to offering courses in the liberal arts and in business administration, specialized courses for particular categories of health personnel are offered when such offerings are justified in terms of community and student need. The unique resources of the Boston area as a medical center offer excellent support facilities for these health-related programs.

Degree programs, both associate and baccalaureate, are designed to provide professional specialization and general cultural development. All programs are designed to meet the accreditation standards of the Council on Medical Education of the American Medical Association and of licensing or registration boards where such exist.

Course Distribution

While students will graduate from the programs in health science prepared to assume a position in the health profession of his choice, and in which he has specialized, it is the goal of Northeastern University that graduates will have a balanced educative background. To this end, the following curriculum design will be in effect for most programs.

Professional and Professionally Related	35-50%
Basic and Allied Sciences	25-40%
Liberal Arts (non-science)	25-40%

Students will choose electives to fulfill course distribution requirements and to equal the number of credits required for the specific degree.

Clinical Assignments

Clinical assignments are available for students whose program requires directed applied study in a clinical setting. In most instances didactic information is presented at the University while clinical practice is at various hospitals or other health agencies in the Greater Boston community. Academic credit earned during the practicum is applicable in most instances, toward the degree requirement.

Students accepting clinical assignments in hospitals, either as part of their clinical rotations or cooperative assignments, are expected to adhere to hospital dress codes and any other requirements of the hospital, all of which are outside University control.

HEALTH SCIENCE**Bachelor of Science in Health Science Degree**

The Bachelor of Science in Health Science is available to students holding an Associate Degree and/or certification, registration, or licensure (as defined by University regulations) in a specific health profession.

REQUIREMENTS FOR THE DEGREE**DISTRIBUTION REQUIREMENTS****quarter hours**

A. Liberal Arts (non-science)	25-40%	44-70
B. Basic and Allied Science	25-40%	44-70
C. Professional and Professionally-related	35-50%	62-86
D. Electives—to equal	100%	<u>174</u>

A. LIBERAL ARTS

(Non-science)

Required

English		8
30.601, 30.602 or 30.603	Composition and Rhetoric I, II, (or intensive) or equivalent	
30.604, 30.605 or 30.606	Introduction to Literary Forms I & II (or intensive) or equivalent	
Humanities (Recommended Courses)		12
	Introduction to Philosophy Spanish or Other Modern Language Communications or Speech Literature Arts	
Social Sciences (Recommended Courses)		12
	Psychology History Sociology Principles of Political Science	
Electives	to equal at least 12 quarter hours	12
		<u>44</u>

B. BASIC AND ALLIED SCIENCES

quarter hours

Required

General	General and Animal Biology	8
	Anatomy and Physiology	9
	Microbiology	4
	Math or Applied Math	6
	(as profession demands)	
	General Chemistry	9
	(if profession demands)	

Advanced 8

To be taken after matriculation into B.S. program and to be determined by profession.

44
C. PROFESSIONAL AND PROFESSIONALLY RELATED**Required**

quarter hours

General **14**

86.504, 86.505, 86.506 Foundations of Medical Science I, II, III 6
or

86.512, 86.513

86.541, 86.542 Medical Care and Current Social Problems 4

86.521, 86.522 Public Health 4

87.544, 87.545 Epidemiology 4

or equivalent

Basic Professional Courses (variable)

Those required for professional certification, registration, or licensure as defined by University regulations.

Advanced Professional or Professionally-related Courses **18-24**

To be taken after matriculation into B.S. program:

General Health area 6-8

(or profession) as determined
by program director

Health Science Education 6-8

OR

Related Education Courses

Health Science Administration 6-8

OR

Related Administration Courses

D. ELECTIVES

To equal 174 q.h. credits and to fulfill distribution requirements.

All students admitted to this program will be interviewed by Program Director and/or Admissions Committee. Specific applications are available.

MANAGEMENT IN HEALTH AGENCIES AND INSTITUTIONS

Bachelor of Science Degree

Basic Courses—required

quarter hours

10.327,	10.328,	10.329	Mathematics I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
23.501,	23.502,	23.503	Western Civilization I, II, III	6	
	30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	32

Core Courses—required

Liberal Arts

18.511,	18.512,	18.513	Biology I, II, III	12*	
		19.532	Industrial Psychology	2	
21.501,	21.502,	21.503	Sociology I, II, III	6	
22.501,	22.502,	22.503	Principles of Political Science I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	
Literature:			English, American, or other in translation	6	
Fine Arts:			Art, Music, or Theater Arts	6	44

Management

41.501,	41.502,	41.503	Accounting Principles I, II, III	6	
44.507,	44.508,	44.509	Corporate Finance I, II, III	6	
45.501,	45.502,	45.503	Management and Organization I, II, III	6	
	45.511,	45.512	Human Relations in Personnel I, II	4	
45.513,	45.514,	45.515	Personnel Management I, II, III	6	
45.570,	45.571,	45.572	Electronic Data Processing I, II, III	6	34

Health Care Administration

		86.502	Hospital Law and Ethics	2	
86.504,	86.505,	86.506	Foundations of Medical Science I, II, III	6	
		86.507	Medical Terminology	2	

In addition, each student will select one of the following sequences:

86.581,	86.582,	86.583	Hospital Organization and Management I, II, III—OR	}	6
86.571,	86.572,	86.573	Long-Term Care Administration I, II, III—OR		
	86.521,	86.522	Public Health I, II		
		86.511	Personal and Community Health		
				4 and 2	16

Elective Courses:

Liberal Arts	6	
Management	6	
From Any Area	36	48

Total Credits

174

Note: In addition to the required coursework, proof of understanding of principles of descriptive statistics must be demonstrated. This requirement may be satisfied by: a) successful completion of the examination on descriptive statistics administered by Northeastern's Center for Programmed Study; or b) completion of the program on descriptive statistics at the Center; or c) completion of the University College course 39.511, Statistics I, with a grade of C or better. This last option may also be included in the elective credits required in this curriculum. This requirement should be satisfied before completion of the first 96 credits of coursework.

A significant number of elective courses are allowed, to permit each student to select, with his adviser, a sequence of courses which will represent examination in some depth of a subject of particular interest. Ordinarily, these courses would not be distributed over more than two subject areas.

MANAGEMENT IN HEALTH AGENCIES AND INSTITUTIONS

Recommended Course Sequence for the 8-Year Program Leading to the Bachelor of Science Degree

	Quarter 1	Quarter 2	Quarter 3
1st Year	Medical Terminology I Mgmt. & Org. I Math. I	Comp. I Mgmt. & Org. II Math. II	Comp. II Mgmt. & Org. III Math. II
2nd Year	Western Civ. I Acctg. I Biology I	Western Civ. II Acctg. II Biology II	Western Civ. III Acctg. III Biology III
3rd Year	Psych. I Elective Intro. to Lit. Forms I	Psych. II Elective Intro. to Lit. Forms II	Psych. III Elective Hospital Law
4th Year	Ind. Psych. Pers. Mgmt. I Found. Med. Sci. I	Human Rel. I Pers. Mgmt. II Found. Med. Sci. II	Human Rel. II Pers. Mgmt. III Found. Med. Sci. III
5th Year	Econ. I Fine Arts Mgmt. Elective Literature	Econ. II Fine Arts Mgmt. Elective Literature	Econ. III Fine Arts Mgmt. Elective Literature
6th Year	Soc. I E.D.P. I L. A. Elective Corp. Fin. I	Soc. II E.D.P. II L.A. Elective Corp. Fin. II	Soc. III E.D.P. III L.A. Elective Corp. Fin. III
7th Year	Pol. Sci. I Hospital Org., Long-Term C. I, or Pub. Health I Elective Elective Elective	Pol. Sci. II Hospital Org., Long-Term C. II, or Pub. Health II Elective Elective Elective	Pol. Sci. III Hospital Org., Long-Term C. III, or Per. Comm. Health Elective Elective Elective
8th Year	Phil. I Elective Elective	Phil. II Elective Elective	Phil. III Elective Elective

NURSING HOME ADMINISTRATION CERTIFICATE PROGRAM

Under the Social Security Law—Title XIX, programs for the licensure of nursing home administrators must be available in each state. In order to provide the educational preparation required by Title XIX and to meet the immediate needs of long term care and nursing home administrators, while still providing academically structured courses that will apply to a degree program, the following sequence is offered.

19.501,	19.502,	19.503	Psychology I, II, III	6
		19.532	Industrial Psychology	2
41.501,	41.502,	41.503	Accounting Principles I, II, III	6
		45.501	Management and Organization I	2
	45.511,	45.512	Human Relations in Personnel I, II	4
		86.502	Hospital Law and Ethics	2
86.504,	86.505,	86.506	Foundations of Medical Science I, II, III	6
	86.507,	86.508	Medical Terminology I, II	4
86.571,	86.572,	86.573	Long-Term Care Administration I, II, III	6
86.577,	86.578,	86.579	Long-Term Care Administration IV, V, VI	6

Total Credits**44**

Successful completion of this course of study with a quality point average of 2.00 will entitle the student to a letter attesting to this accomplishment and will prepare the student to write the present licensure examination in Massachusetts. The Board of Registration in Nursing Home Administration in Massachusetts will require two years of college level study (four years, part time) by 1975 and a baccalaureate degree by 1978.

Completion of the above described sequence of courses and possession of the letter documenting this fact does not constitute graduation from University College.

Program Consultant:

Robert Lovejoy, M.S.

Executive President, Waltham Hospital

Lecturer in Health Science, Northeastern University

Course Consultant in Nursing Home**Administration Program:**

Jack Chilnick, M.Ed.

Executive Director, Jewish Rehabilitation

Center for the Aged of the North Shore

Lecturer in Health Science, Northeastern University

MEDICAL RECORD ADMINISTRATION

The Profession

The medical record administrator has varied responsibilities relating to health information systems. He designs systems; he plans, organizes, and directs medical record services; he develops, analyzes, and evaluates medical records and indexes; he cooperates with the medical staff in developing methods for evaluation of patient care; he cooperates with the medical and administrative staff in research projects utilizing health care information; and provides advisory services relating to health information systems on local, national, and international level.

The Medical Record Administration Program leading to a baccalaureate degree has been in effect at Northeastern University since 1966. The professional certification program, open to students already holding baccalaureate degrees and offering the required professional courses was instituted in 1967.

Northeastern University's Programs in Medical Record Administration are approved by the American Medical Association's Council on Medical Education, in collaboration with the Committee on Education and Registration of the American Medical Record Association.

Note: *This program is also offered on a full-time (day) basis.*

The information following refers only to the part-time (evening) program. Further information about this Program and/or information about the Day Program may be obtained by contacting the Allied Health Professions Office, 201 Robinson Hall.

MEDICAL RECORD ADMINISTRATION**Bachelor of Science Degree**

Completion of this program qualifies a student for admission to the professional registration examinations conducted by the American Medical Record Association.

Basic Courses—required				quarter hours	
10.327,	10.328,	10.329	Mathematics I, II, III	6	
19.501,	19.502,	19.503	Psychology I, II, III	6	
23.501,	23.502,	23.503	Western Civilization I, II, III	6	
	30.601,	30.602	Composition and Rhetoric I, II	4	
	30.604,	30.605	Introduction to Literary Forms I, II	4	
39.501,	39.502,	39.503	Economic Principles and Problems I, II, III	6	32
				—	

Core Courses—required*Liberal Arts:*

18.511,	18.512,	18.513	General Biology and Laboratory I, II, III	12	
18.524,	18.525,	18.526	Anatomy and Physiology I, II, III	9	
		19.532	Industrial Psychology	2	
21.501,	21.502,	21.503	Sociology I, II, III	6	
22.501,	22.502,	22.503	Principles of Political Science I, II, III	6	
26.501,	26.502,	26.503	Introduction to Philosophy I, II, III	6	
<i>Literature:</i>			English, American or other in translation	6	
<i>Fine Arts:</i>			Art, Music, or Theatre Arts	6	53
				—	

Professional and Professionally-related Courses—required

45.501,	45.502,	45.503	Management and Organization I, II, III	6	
	45.511,	45.512	Human Relations in Organizations	4	
	45.570,	45.571	Electronic Data Processing I, II	4	
		86.585	Medical Computer Science	2	16
				—	
		86.502	Hospital Law and Ethics	2	
86.504,	86.505,	86.506	Foundations of Medical Science I, II, III	6	
	86.507,	86.508	Medical Terminology I, II	4	12
				—	
86.551,	86.552,	86.553	Organization of the Medical Records Department I, II, III	6	
86.554,	86.555,	86.556	Medical Record Science I, II, III	12	
	85.557,	86.558	Medical Record Science IV, V	8	
86.586,	86.587,	86.588	Applied Medical Record Science I, II, III	8	34
				—	

Elective Courses

Liberal Arts	6	
From Any Area	22	28
		—
Total Credits		175

Candidates who wish to major in this program must be interviewed by the Program Director. Arrangements for this interview may be made through the Allied Health Professions Office, 201 Robinson Hall. No candidate will be considered as matriculated until this requirement has been met.

Note: In addition to the required coursework, proof of understanding of principles of descriptive statistics must be demonstrated. This requirement may be satisfied by: a) successful completion of the examination on descriptive statistics administered by Northeastern's Center for Programmed Study; or b) completion of the program on descriptive statistics at the Center; or c) completion of the University College course 39.511; Statistics I, with a grade of C or better. This last option may also be included in the elective credits required in this curriculum. This requirement should be satisfied before completion of the first 96 credits of coursework.

Recommended Course Sequence for the 8-Year Program Leading to the Bachelor of Science Degree in Medical Records and qualification for examination.

	Quarter 1	Quarter 2	Quarter 3
1st Year	Comp. and Rhet. I Mgmt. & Org. I Math. I	Comp. and Rhet. II Mgmt. & Org. II Math. II	Elective Mgmt. & Org. III Math. III
2nd Year	West. Civ. I Gen. Biol. & Lab. I Elective	West. Civ. II Gen. Biol. & Lab. II Elective	West. Civ. III Gen. Biol. & Lab. III Elective
3rd Year	Psych. I Anat. & Physiol. I Med. Termin. I Lit. I	Psych. II Anat. & Physiol. II Med. Termin. II Lit. II	Psych. III Anat. & Physiol. III Hospital Law Elective
4th Year	Literature Soc. I Ind. Psych. Found. Med. Sci. I	Literature Soc. II Human Rel. I Found. Med. Sci. II	Literature Soc. III Human Relations II Found. Med. Sci. III
5th Year	Econ. I Fine Arts Med. Rec. Sci. I	Econ. II Fine Arts Med. Rec. Sci. II	Econ. III Fine Arts Med. Rec. Sci. III
6th Year	Med. Rec. Sci. IV*	Med. Rec. Sci. V*	Electives
7th Year	Pol. Sci. I Org. Med. Rec. I L.A. Elective	Pol. Sci. II Org. Med. Rec. II L.A. Elective	Pol. Sci. III Org. Med. Rec. III L. A. Elective Elective
8th Year	Phil. I E.D.P. I Elective Applied Med. Rec. Sci. I	Phil. II E.D.P. II Elective Applied Med. Rec. Sci. II	Phil. III Med. Comp. Sci. Elective Applied Med. Rec. Sci. III

*Required clinical experience hours must be arranged in relation to courses starred.

MEDICAL RECORDS**Certification Program**

Candidates who wish to qualify for admission to the professional examination leading to registration as a Medical Record Administrator, RRA, and who already hold a baccalaureate degree in another field of study from a college or university acceptable to Northeastern University, may undertake the following course work. Successful completion of this course sequence with a cumulative point average of 2.00 will lead to certification from University College that the candidate has completed a professional program in Medical Records Science.

Courses required for Professional Certification:

				quarter hours
18.524,	18.525,	18.526	Anatomy and Physiology I, II, III	9
45.501,	45.502,	45.503	Management and Organization I, II, III	6
		86.502	Hospital Law and Ethics	2
86.504,	86.505,	86.506	Foundations of Medical Science I, II, III	6
	86.507,	86.508	Medical Terminology I, II	4
86.554,	86.555,	86.556	Medical Record Science I, II, III	12
	86.557,	86.558	Medical Record Science IV, V	8
86.551,	86.552,	86.553	Organization of the Medical Records Department I, II, III	6
	45.570,	45.571	Electronic Data Processing I, II	4
		86.585	Medical Computer Science	2
86.586,	86.587,	86.588	Applied Medical Records Science, I, II, III	8
Total Credits				67

Candidates who wish to matriculate in this program must be interviewed by the Program Director. Arrangements for this interview may be through the Allied Health Professions Office, 201 Robinson Hall. No candidate will be considered as matriculated until this requirement has been met.

Note: In addition to the required coursework, proof of understanding of principles of descriptive statistics must be demonstrated. This requirement may be satisfied by: a) successful completion of the examination on descriptive statistics administered by Northeastern's Center for Programmed Study; or b) completion of the program on descriptive statistics at the Center; or c) completion of the University College course 39.511, Statistics I, with a grade of C or better. This last option may also be included in the elective credits required in this curriculum. This requirement should be satisfied before completion of the first 96 credits of coursework.

Note: This sequence is available through the evening program only.

MEDICAL RECORD ADMINISTRATION**Recommended Course Sequence for the 3-Year Program
Leading to a Certificate in Medical Record Administration**

This program is open to candidates who hold an acceptable baccalaureate degree only.

Prerequisite: A College-level course in General Biology

	Quarter 1	Quarter 2	Quarter 3
1st	Mgmt. & Org. I	Mgmt. & Org. II	Mgmt. & Org. III
Year	Anat. & Physiol. I	Anat. & Physiol. II	Anat. & Physiol. III
	Found. Med. Sci. I	Found. Med. Sci. II	Found. Med. Sci. III
	Med. Termin. I	Med. Termin. II	
2nd	Med. Rec. Sci. I	Med. Rec. Sci. II	Med. Rec. Sci. III
Year	EDP I	EDP II	Hospital Law
			Med. Comp. Sci.
3rd	*Med. Rec. Sci. IV	*Med. Rec. Sci. V	
Year	Org. Med. Rec. Dept I	Org. Med. Rec. Dept II	Org. Med. Rec. Dept III
	Applied Med. Rec. Sci. I	Applied Med. Rec. Sci. II	Applied Med. Rec. Sci. III

Hospitals Affiliated as Primary Teaching Units

Beth Israel Hospital, Boston
 Children's Hospital Medical Center, Boston
 Massachusetts General Hospital, Boston
 New England Medical Center
 Boston Hospital for Women
 Mt. Auburn Hospital, Cambridge

Curriculum Advisory Committee in Medical Record Administration

Sr. Margaret MacDougall, RRA
 Holyoke Community College
 Janice E. Gardner, RRA
 Nashoba Community Hospital, Ayer
 Joyce Gormley, RRA
 Massachusetts General Hospital, Boston
 Marjorie Gurney, RRA
 Massachusetts Hospital Association, Burlington
 Dorothy Richmond, RRA
 Beth Israel Hospital, Boston
 Susan Winship, RRA
 Northern Essex Community College, Haverhill
 Lillian Liebich, RRA
 North Adams Regional Hospital, North Adams

Northeastern University Representatives**(Ex officio)**

Rina L. Zamczyk, RRA
 Director, Medical Records Program
 Helene A. Loux, Ph.D.
 Associate Dean for Health Professions
 The College of Pharmacy and Allied Health Professions

*Required clinical experience hours must be arranged in relation to courses starred.

RESPIRATORY THERAPY (full-time)

The Profession

As medical knowledge has advanced and become highly specialized, trained personnel in the fields related to medicine have become important members of the health care team. As members of this team, respiratory therapists support and assist in the effort toward optimum patient care by using a variety of treatments and rehabilitative procedures to help patients with respiratory problems. They work in modern health care facilities with sophisticated respirators, ultrasonic nebulizers, blood gas machines, pulmonary function equipment, and oxygen administering devices.

As physicians rely more and more on specialized techniques and equipment, the respiratory therapist will play an increasingly important role in patient care.

ASSOCIATE DEGREE PROGRAM

The first year of this program may be completed by study on a part-time basis over two or more years. *An interview with the program faculty is required prior to registration in 86.591, Introduction to Respiratory Therapy I.* The candidate who completes this part-time study with a cumulative average "C" or better may then apply for admission directly into the second year full-time program. Entrance to the full-time program is on a competitive basis. The second and third years of the full-time program are spent in alternating academic and co-operative quarters. Each academic quarter includes twelve hours per week of applied study in Respiratory Therapy as well as didactic study, liberal arts, and electives.

Prerequisite: College-Level or College-Preparatory General Biology.

Freshman Year Courses			quarter hours
10.327, 10.328, 10.329	Math I, II, III		6
30.603 (or 30.601 and 30.602) and 30.606 (or 30.603 and 30.604)	Composition & Rhetoric		4
18.524, 18.525, 18.526	Intro. to Lit. Forms		4
19.501, 19.502	Human Anatomy and Physiology		9
86.502	Psychology		4
18.521, 18.522	Hospital Law & Ethics		2
86.591, 86.592, 86.593	Microbiology I, II		8
	Intro. to Respiratory Therapy		12

Suggested Sequence of Courses for Freshman Program

	Quarter I	Quarter II	Quarter III
1st Year	Math Anatomy & Physiol. Psychology	Math Anatomy & Physiol. Psychology	Math Anatomy & Physiol. Hospital Law & Ethics
2nd Year	Comp. & Rhet. Intro. Resp. Therapy Microbiology	Intro. to Lit. Forms Intro. Resp. Therapy Microbiology	Intro. Resp. Therapy

Students completing these courses must now apply to the full-time program in order to complete the requirements for the Associate in Science Degree and for eligibility to write the national examination for registration as a Respiratory Therapist.

Students accepted into the full-time day program will follow the basic college curriculum in effect at the time of their acceptance.

Medical Advisory Committee

Leonard Bushnell, M.D., Beth Israel Hospital
Dean S. Crocker, M.D., Children's Hospital Medical Center
John Hedley-Whyte, M.D., Beth Israel Hospital
Henning Pontoppidan, M.D., Massachusetts General Hospital
LeRoy Van Dam, M.D., Peter Bent Brigham Hospital

Academic Representatives (Ex Officio)

Dean Crocker, M.D., Medical Consultant
Evelyn L. Cassara, B.S., R.N., A.R.I.T., Program Director
Helene A. Loux, Ph.D., Assoc. Dean for Health Professions, College of
Pharmacy and Allied Health Professions

MEDICAL LABORATORY SCIENCE—CYTOTECHNOLOGY**Bachelor of Science Degree or Associate in Science Degree****The Profession**

Cytotechnology is a speciality in the broader field of medical laboratory science. Cytotechnologists are employed in pathology laboratories, where they expertly examine slides of cells looking for minute abnormalities which are the early warning signs of cancer and related disease. Cytotechnology occupies a highly important place in clinical medicine, requiring a technologist with highly specialized laboratory training and a sound academic background.

The programs are offered through University College and are conducted in affiliation with the several hospitals which comprise the Boston School of Cytotechnology. The programs lead to the Associate in Science or the Bachelor of Science Degree, which are awarded by University College. Completion of the program qualifies a student for admission to the professional examination conducted by the Board of Registry of the American Society of Clinical Pathologists.

The basic sciences and the general education courses are offered evenings, but the professional courses are offered only full-time, days, in cooperation with the affiliated hospitals. Students planning to enter the professional courses are advised to consult the program coordinator prior to the Winter Quarter preceding entrance to the hospital program.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Basic Mathematics I and II courses (10.330 and 10.331). The Mathematics Placement Test must be taken well in advance of the registration date.

FIRST YEAR

Course Number	Course	quarter hours
10.327, 10.328, 10.329	Mathematics I, II, III	6
	or	
10.307, 10.308	College Algebra & Trigonometry	
30.603		
or 30.601, 30.602	Composition & Rhetoric I, II	4
18.511, 18.512, 18.513	Biology I, II, III	12
87.100	Medical Laboratory Science	
	Orientation	1
86.541, 86.542	Medical Care and Current Social Problems	4

SECOND YEAR

Course Number	Course	quarter hours
18.524, 18.525, 18.526	Human Anatomy & Physiology I, II, III	9
12.544, 12.545, 12.546	General Chemistry I, II, III	6
12.547, 12.548, 12.549	General Chemistry Lab. I, II, III	3
19.501, 19.502, 19.503	Psychology	6
	or	
22.501, 22.502, 22.503	Principles of Political Science	
	or	
	Other Social Science Elective	
30.604, 30.605	or	
	30.606 Introd. to Literary Forms	4
	86.502 Hospital Law and Ethics	2

THIRD YEAR

Course Number	Course	quarter hours
87.101	Basic Medical Lab. Science (Fall)	4
87.102 or 87.542	Hematology	2
18.557, 18.558, 18.556	Genetics I, II and Genetics Lab.	6
18.551, 18.552, 18.553	Histology — Organology I, II, III	6
18.521	Microbiology	4
	Humanities Electives	4

FOURTH YEAR

12 months at an AMA-approved Hospital School of Cytotechnology. Those students admitted to the Boston School of Cytotechnology associated with Northeastern University will take the following courses:

		87.508	Introduction to Cytotechnology	2
		87.528	Cytopathology I	2
		87.538	Cytopathology II	2
		87.558	Cytopathology III	2
		87.568	Cytogenetics and New Concepts	2
		87.598	Special Topics	2
		87.608	Seminar: Cytopathology Criteria and Correlations	2
87.518,	87.548,	87.578	Applied Cytology I, II, III, IV	14
		87.618		

Total A.S. Degree 111

FIFTH YEAR

Course Number	Course	quarter hours
86.504, 86.505, 86.506	Foundations of Medical Science	6
11.304, 11.305, 11.306	*General Physics I, II, III	6
	or	
86.581, 86.582, 86.583	Hospital Organization and Management	
	Modern Language	9
	or	
	Electives	

*Students planning to enter graduate school should take 4 quarter hours of Analytical Chemistry and 6 quarter hours of Physics.

SIXTH YEAR

Course Number	Course	quarter hours
12.531, 12.532, 12.533	Organic Chemistry I, II, III, and	6
12.534, 12.535, 12.536	Organic Chemistry Lab. I, II, III	6
86.574, 86.575,	Health, Disease, and Disability	4
29.501, 29.502, 29.503	Effective Speaking	6
	or	
	Other Speech or Communications Course	

SEVENTH YEAR

Course Number	Course	quarter hours
39.501, 39.502, 39.503	Economics, Principles & Problems	6
	or	
	Other Social Science Elective	
86.521, 86.522	Public Health	4
	or	
87.544, 87.545	Epidemiology	
87.588	Cytopathology Seminar	2
87.546	Medical Laboratory Science	
	Education Seminar	2
87.547	Medical Laboratory Science	
	Administration Seminar	2
	Electives	6
Total B.S. Degree		<u>176</u>

MEDICAL LABORATORY SCIENCE—MEDICAL TECHNOLOGY**Bachelor of Science Degree or Associate in Science Degree****The Profession**

Medical Technology is a most respected and important health profession. The medical technologist works as a professional in close association with pathologists, doctors, and hospital and medical laboratory personnel. Working in a variety of specialized fields such as bacteriology, blood-banking, histology, hematology, biochemistry, and nuclear and radiochemistry, the medical technologist makes important observations necessary for critical diagnosis by the doctor upon early detection and treatment of disease.

The Associate Degree Medical Laboratory Technician likewise is an important member of the health team. His responsibilities are commensurate with his background and he works in close association with medical technologists and pathologists.

The Registered Medical Technologist and the Associate Degree Medical Laboratory Technician are in constant demand in hospital laboratories, clinics, public health agencies, pharmaceutical firms, research foundations, and in the Armed Forces.

The baccalaureate program in Medical Technology (Medical Laboratory Science) is conducted in affiliation with several Hospital Schools of Medical Technology approved by the Council on Medical Education of the American Medical Association. The program leads to a Bachelor of Science degree, which is awarded by University College, and entitles the student to write the registry examination in Medical Technology MT (ASCP) given by the Board of Registry of Medical Technologists of the American Society of Clinical Pathologists.

Students who have appropriate clinical experience may apply to write the AD-MLT (ASCP), Associate Degree Medical Laboratory Technician Examination, upon completion of appropriate courses. University College students will be eligible for an Associate degree upon the completion of the courses indicated in the curriculum below and appropriate applied study.

The basic science and general education courses are offered evenings, but the professional courses are offered only full-time, days, in cooperation with the affiliated hospitals. Students planning to enter the professional courses are advised to consult the program coordinator prior to the Winter Quarter preceding entrance to the hospital program.

The Medical Laboratory Science Professional Courses, numbered 87 . . . , will be offered directly through the College of Pharmacy and Allied Health Professions.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Basic Mathematics I and II courses (10.330 and 10.331). The Mathematics Placement Test must be taken well in advance of the registration date.

FIRST YEAR

Course Number	Course	quarter hours
10.307, 10.308	College Algebra & Trigonometry I, II	8
12.544, 12.545, 12.546	General Chemistry I, II, III	6
12.547, 12.548, 12.549	General Chemistry Lab. I, II, III	3
30.603 or 30.601 & 30.602	Composition and Rhetoric I & II	4
87.100	Medical Laboratory Science Orient.	1
86.541, 86.542	Medical Care and Current Social Problems	4

SECOND YEAR

Course Number	Course	quarter hours
18.511, 18.512, 18.513	Biology I, II, III	12
12.531, 12.532, 12.533	Analytical Chemistry I, II, III	6
12.524, 12.525, 12.526	Analytical Chemistry Lab. I, II, III	6
30.604, 30.605 or 30.606	Introduction to Literary Forms	4

THIRD YEAR

Course Number	Course	quarter hours
18.524, 18.525, 18.526	Human Anatomy and Physiology	9
19.501, 19.502, 19.503	Psychology I, II, III	6
	or	
22.501, 22.502, 22.503	Principles of Political Science	
	or	
	Other Social Science Elective	
86.502	Hospital Law and Ethics	2
18.521, 18.522	Microbiology I, II	8

FOURTH YEAR

Course Number	Course	quarter hours
87.101	Basic Medical Laboratory Science	4
87.102, 87.103	Basic Hematology; Basic Blood Banking	4
87.105	Basic Medical Laboratory Chemistry & Instrumentation	4
87.121	Quality Control	2
	Modern Language	9
	or	
	Other Humanities Electives	

Total A.S. Degree 102

Associate degree requirement completed for students who have appropriate applied study, and have completed a minimum of 102 quarter hours of credit including those courses listed above.

FIFTH YEAR

Course Number	Course	quarter hours
39.501, 39.502, 39.503	Economic Principles & Problems I, II, III or Other Social Science Elective	6
12.531, 12.532, 12.533	Organic Chemistry I, II, III	6
12.534, 12.535, 12.536	Organic Chemistry Lab. I, II, III Electives (non-science)	6 6

SIXTH YEAR

Course Number	Course	quarter hours
11.304, 11.305, 11.306	General Physics, I, II, III	6
18.557, 18.558, 18.556	Genetics I, II, & Lab. Elective	6 3
29.501, 29.502, 29.503	Effective Speaking or Other Speech or Communications course	6

SEVENTH YEAR

12 months internship at an affiliated AMA-Approved Hospital School of Medical Technology.

	or	
87.202	Hematology-Immunohematology	4
87.201	Pathogenic Microbiology	4
87.205	Clinical Chemistry	4
87.203	Medical Immunology-Serology	2
87.204	Medical Parasitology	2
87.111, 87.112, 87.115	Applied Studies (at hospital)	12
87.190	Undergraduate Research	2
87.221	Medical Laboratory Management or	
87.226	Health Science Education	2
	Total B.S. Degree	179

RADIOLOGIC TECHNOLOGY**Associate in Science Degree**

The program in Radiologic Technology is a joint offering of the University and several area hospitals. The classroom experiences are provided by the University, and the laboratory practicum is conducted at approved Hospital Schools of Radiologic Technology. These are accredited by the Council on Medical Education of the American Medical Association. The Committee on Radiologic Technology Education of the Massachusetts Radiological Society and the Massachusetts Society of Radiologic Technologists serve in advisory capacities concerning curriculum content.

The Radiologic Technologist is a respected member of the allied health team in the diagnostic and therapeutic environment of the clinic or hospital, and an important functionary in the production, quality control, and inspection laboratories of the industrial community. Medically related responsibilities demand effective rapport with internists, surgeons, pathologists, nurses, and laboratory personnel while industrial competency requires close association with metallurgists, production and manufacturing specialists, engineers, and scientists.

Prerequisite: Satisfactory completion of the Mathematics Placement Test or the Basic Mathematics I and II courses (10.330 and 10.331) and acceptance by an A. M. A. accredited School of Radiologic Technology which is affiliated with Northeastern University.

Have an interview with the Radiological Technology Program Director, Professor Matthew Stevens, 437-2818, 2819.

Be accepted to the affiliated hospital through an interview with the Radiologist.

FIRST YEAR

Two alternating twelve-week terms of full-time didactic study at Northeastern University and two twelve-week terms of full-time radiologic practicum and seminars at the affiliated Hospital Schools.

Didactics — 24 weeks (at Northeastern University)

Course number	Course	quarter hours
10.391, 10.392	Mathematics, A, B	6
18.570, 18.571	Gross Anatomy and General Physiology I, II	6
86.620, 86.621	Radiologic Technology Orientation I, II	4
86.622, 86.623	Radiological Science I, II	8
86.624, 86.625	Principles of Radiology I, II	8
86.626, 86.627	Radiologic Photography & Exposure I, II	8

Practicum — 28 weeks (at Hospital Schools of Radiologic Technology)

86.647	Radiology Practicum	12
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SECOND YEAR

Full-time attendance at the affiliated Hospital Schools of Radiologic Technology (52 wks @ 40 hrs/wk = 2080 hrs)

Students who satisfactorily complete the first and second year of didactics and practicum are eligible to take the American Radiologic Technology examination for certification as a Radiologic Technician (R.T.)

THIRD YEAR

Three Quarters (36 weeks) part-time evening study at University College.

Course Number	Course	quarter hours
18.511, 18.512, 18.513	Biology I, II, III	12
30.601, 30.602	Composition & Rhetoric I, II	4
	English Elective	2
86.614, 86.615, 86.616	Adv. Radiologic Technology I, II, III	6

FOURTH YEAR

19.501, 19.502, 19.503	Psychology I, II, III or	
21.501, 21.502, 21.503*	Sociology I, II, III	6
45.501, 45.502, 45.503	Management & Organization I, II, III	6
86.617, 86.618, 86.619	Radioactive Isotopes & Therapy I, II, III	6
	Humanities Elective I, II, III	6

Total A.S. degree 100

Qualified students may accelerate completion of the program by enrolling in third or fourth year evening courses during the second internship year upon petition for approval by the Director of Radiologic Technology in University College for the Radiologist in charge of the Hospital School of Radiologic Technology involved.

Please see day school course descriptions for professional courses associated with the A.M.A. Hospital Approved Programs.

*21.601, 21.602 Principles of Sociology I, II (8 q.h.) may be substituted for 21.501, 21.502, 21.503 Sociology I, II, III (6 q.h.)

MEDICAL LABORATORY SCIENCE—HEMATOLOGY**Bachelor of Science Degree****The Profession**

Hematology is a specialty in the broader field of medical laboratory science. Hematology technologists are employed in hospitals and clinical laboratories where they perform specific laboratory tests—including differential cell counts and bone marrow examinations and hemoglobin and hematocrit determinations—which aid in the diagnosis, treatment, and follow up of infections, anemias, and leukemias. The hematology technologist also performs coagulation studies which aid the diagnosis and treatment of bleeding disorders and the treatment of patients on anticoagulant therapy. The modern hematology laboratory is well equipped with electronic instruments which the technologist must operate and maintain. Additional responsibilities include laboratory quality control and associated problem-solving.

The current requirements for categorical certification in hematology are indicated by the Board of Registry of the American Society of Clinical Pathologists as follows:

A candidate for certification in hematology must meet at least one of the following requirements:

1. Certification in Medical Technology by the Board of Registry of the American Society of Clinical Pathologists, plus one year of satisfactory hematology experience in an acceptable laboratory within the three years immediately prior to application.
2. A baccalaureate degree in biological sciences or chemistry from a college or university accredited by a recognized regional accrediting agency plus two years of hematology experience in an acceptable laboratory.

Students should contact the American Society of Clinical Pathologists, Board of Registry, P.O. Box 4872, Chicago, Illinois 60680, for details concerning their eligibility to write the hematology examination.

The curriculum in hematology does not incorporate a clinical or applied study component, but is primarily designed for one who works in this field, giving him the opportunity to earn a baccalaureate degree with a concentration in his area of interest.

FIRST YEAR

Course Number	Course	quarter hours
10.307, 10.308	College Algebra & Trigonometry I, II	8
12.544, 12.545, 12.546	General Chemistry I, II, III	6
12.547, 12.548, 12.549	General Chemistry Lab. I, II, III	3
30.603	Composition & Rhetoric I & II	4
30.606	Introduction to Literary Forms	4
87.100	Medical Laboratory Science Orientation	1

			SECOND YEAR	
Course Number			Course	quarter hours
18.511,	18.512,	18.513	Biology I, II, III	12
			Humanities Elective	6
**12.531,	12.532,	12.533	Analytical Chemistry I, II, III and	} or equiv. 6
12.524,	12.525,	12.526	Analytical Chemistry Lab. I, II, III	
THIRD YEAR				
86.502			Hospital Law and Ethics	2
87.101			Basic Medical Laboratory Science	4
*87.102,	87.103		Basic Hematology, Basic Blood Banking or Elective	4
87.105			Basic Medical Laboratory Chemistry and Instrumentation	4
87.121			Quality Control	2
18.557,	18.558,	18.559	Genetics	6
FOURTH YEAR				
18.524,	18.525,	18.526	Human Anatomy and Physiology, I, II, III	9
			Social Science Elective	6
18.521,	18.522,	18.523	Microbiology I, II or	8
18.520			Med. Microbiology (4) and Elective (4)	8
FIFTH YEAR				
87.541,	87.542,	87.543	Morphologic Hematology (Basic Hem. I, II, III)	6
12.531,	12.532,	12.533	Organic Chemistry I, II, III	6
12.534,	12.535,	12.536	Organic Chemistry Lab. I, II, III	6
			Social Science Elective	6
SIXTH OR SEVENTH YEAR				
**11.304,	11.305,	11.306	General Physics I, II, III or Elective	6
87.211			Coagulation	3
87.213			Immunohematology	2
87.222			Histochemistry	3
			New Cell Biology Elective	4
			Humanities Elective	6
SIXTH OR SEVENTH YEAR				
86.574,	86.575		Health, Disease, & Disability or Instrumentation or Electronics Elective	4 6 6
87.203			Med. Immunology Serology (Intensive)	2
87.204			Hem. Parasitology	2
87.190			Undergrad Research	2
87.547			Med. Lab. Science Adm. Sem.	2
87.546			Med. Lab. Science Educ. Sem. Ed. or Adm. Health Science Elective	2 6

Note: Strongly recommended electives are: Psychology, Economics

*Students with extensive laboratory experience in a hematology laboratory, may be exempt from these courses.

**An. Chem. and Physics recommended for students applying to graduate school.

education

GENERAL OBJECTIVES

The teacher education program in University College is deeply concerned with the quality of those who teach. In the paragraphs that follow, quality is generally described and the several ways of assessing it are outlined.

Objective I: *Every teacher should be broadly educated.*

All students are expected to develop breadth in their program in two ways. First, students will be required to complete certain common course work: social science, United States history, American literature, effective speaking, human development, and English. Second, all students must complete a minimum of 16 credits in each of the following areas: science and mathematics, humanities, and social sciences.

Objective II: *Every teacher should achieve an expertness in some field of knowledge.*

The Teacher Education Program in University College offers an academic major in the field of English. The major is designed to prepare English teachers for the junior or senior high school. It will also provide a basis for specialized graduate study in English as well as in education.

Objective III: *Each teacher should be professionally prepared for the position of his choice.*

In addition to their general education and specialized concentration, all students will share some common professional course work with related out-of-class experience and, in addition, will take course work appropriate to their level or field of teaching. Student teaching during the senior year will serve as an opportunity to apply what has been learned in the previous years. Beginning students will have about two years to estimate their abilities to master college work, to discover the wisdom of their choice of a major field, and to evaluate the strength of their commitment to, and qualifications for, teaching.

Admission Requirements

Important to the future teacher is high ability in the communication skills and adequate strength in the field of special interest. As important as the pattern and quality of an applicant's preparation are the personal qualifications which contribute to success in teaching.

Upon completion of all courses (or their equivalent) listed under Quarters 1-6 on p. 150, students desiring certification must apply to the College of Education* for admission to the professional sequence of the teacher education program. They will be expected to present such evidence as the College of Education shall require. Evaluations will be made on academic aptitude, verbal fluency, interest in working with young people, and emotional maturity. A serious attempt will be made to assess these factors in their interrelationships rather than as isolated phenomena. Students accepted into the professional sequence of the College of Education will be expected to commit themselves to the remaining requirements of the program.

Transfers

Students admitted to advanced standing in University College (see p. 31) may apply for admission to the professional sequence on the basis of satisfactory grades received in courses which are the equivalent of those required for entering Quarter 7 (see p. 150). Credit toward electives may be earned by means of the College Level Examination Program (see p. 32).

GRADUATION REQUIREMENTS

Degrees

University College will award the degree of Bachelor of Science to those who successfully complete the program of preparation for teaching English at the secondary school level.

Quantitative Requirements

The required courses in the curriculum for the teaching of English are listed on a following page. The curriculum requires not less than 173 quarter hours of class work, including one quarter of student teaching. At least 45 quarter hours will be required in education, including student teaching.

Elective Courses

Elective courses, approved by the College of Education adviser, will be selected by the student from among courses in University College, or credit may be earned by means of the College Level Examination Program.

Qualitative Requirements

Students in the Teacher Education Program in University College will be expected to maintain an over-all average of C while doing work of C+ or better in the field of specialization and in the professional sequence in order

*One of the Basic (day) Colleges of Northeastern University

to be recommended for placement. Students are warned that any failure seriously handicaps their records and must be made up at the earliest opportunity.

Graduation with Honor

Candidates of distinctly superior achievement in their academic work will be graduated with honor. Upon special vote of the faculty a limited number of this group may be graduated with high honor or with highest honor. Students must have been in attendance at the University at least six quarters before they may become eligible for honors at graduation.

National Teacher Examinations

All students who plan to make teaching their career will be expected to take the general and special National Teacher Examinations in their senior year.

Programs of Instruction

The teacher education program in University College offers an academic major in the field of English (in grades 7–12). A specimen program is shown on the following page.

Accreditation

Northeastern University's College of Education is accredited by the National Council for Accreditation of Teacher Education. The College is a member of the American Association of Colleges for Teacher Education.

SPECIMEN PROGRAM IN TEACHING OF ENGLISH (IN GRADES 7-12)

This program is designed with the assumption that the student is attending college on approximately a half-time basis.

First Year**QUARTER 1**

No.	Course	Cl.	q.h.
16.501	Nat. Sci. I	2	2
23.501	West. Civ. I	2	2
29.501	Eff. Spkg. I	2	2
30.601	Comp. & Rhet. I*	2	2

QUARTER 2

No.	Course	Cl.	q.h.
16.502	Nat. Sci. II	2	2
23.502	West. Civ. II	2	2
29.502	Eff. Spkg. II	2	2
30.602	Comp. & Rhet. II	2	2

QUARTER 3

No.	Course	Cl.	q.h.
16.503	Nat. Sci. III	2	2
23.503	West. Civ. III	2	2
29.503	Eff. Spkg. III	2	2
30.604	Intro. to Lit. Forms I	2	2

Second Year**QUARTER 4**

No.	Course	Cl.	q.h.
22.501	Prin. Pol. Sci. I	2	2
30.605	Intro. to Lit. Forms II	2	2
50.111	Soc. Sci. I	3	3

QUARTER 5

No.	Course	Cl.	q.h.
22.502	Prin. Pol. Sci. II	2	2
	English Elective	2	2
50.112	Soc. Sci. III	3	3

QUARTER 6

No.	Course	Cl.	q.h.
22.503	Prin. Pol. Sci. III	2	2
	English Elective	2	2
50.113	Soc. Sci. III	3	3

24 Total Credits 21
45

*Students desiring certification must now apply to the College of Education** for admission to the teacher education program.*

Third Year**QUARTER 7**

No.	Course	Cl.	q.h.
23.527	England 500-1603	2	2
26.501	Intro. Phil. I	2	2
30.525	English Language I	2	2
39.501	Ec. Prin. & Prob. I	2	2

QUARTER 8

No.	Course	Cl.	q.h.
23.548	England 1603-1815	2	2
26.502	Intro. Phil. II	2	2
30.526	English Language II	2	2
39.502	Ec. Prin. & Prob. II	2	2

QUARTER 9

No.	Course	Cl.	q.h.
23.549	England Since 1815	2	2
26.503	Intro. Phil. III	2	2
30.527	English Language III	2	2
39.503	Ec. Prin. & Prob. III	2	2

Fourth Year**QUARTER 10**

No.	Course	Cl.	q.h.
23.504	U.S. History I	2	2
30.541	English Lit. I	2	2
50.121	Hum. Dev. & Learn. I	4	4

QUARTER 11

No.	Course	Cl.	q.h.
23.505	U.S. History II	2	2
26.534	Logic	2	2
30.542	English Lit. II	2	2
	Electives	2	2

QUARTER 12

No.	Course	Cl.	q.h.
23.506	U.S. History III	2	2
30.543	English Lit. III	2	2
50.131	Hum. Dev. & Learn. II	4	4

24 24

*An English placement examination must be taken. If the score is not satisfactory, students should enroll for 30.600. Elements of Composition, a 2 q.h. credit course designed to improve command of written English. Then proceed with 30.601, 602, 603, 604 and a 2 q.h. English elective in Quarter 6.

**One of the Basic (day) Colleges of Northeastern University

Fifth Year

QUARTER 13

No.	Course	Cl.	q.h.
30.522	Intro. Semantics I	2	2
30.544	Amer. Lit. I	2	2
51.135	Anal. Tchng. & Ed. Proc.	4	4

QUARTER 14

No.	Course	Cl.	q.h.
30.523	Intro. Semantics II	2	2
30.545	Amer. Lit. II	2	2
	Electives	4	4

QUARTER 15

No.	Course	Cl.	q.h.
	Elective	2	2
30.546	Amer. Lit. III	2	2
54.126	Sec. Reading	4	4

 24

Seventh Year

QUARTER 19

No.	Course	Cl.	q.h.
	Sci. or Math. Elec.	2	2
	Art Music or Thea.		
	Art	2	2
50.151	Bckgrnds. Amer. Ed.	4	4

QUARTER 20

No.	Course	Cl.	q.h.
	Sci. or Math. Elec.	2	2
	Art Music or Thea.		
	Art	2	2
	Electives	4	4

QUARTER 21

No.	Course	Cl.	q.h.
	Sci. or Math. Elec.	2	2
	Art Music or Thea.		
	Art	2	2
50.143	M&M—English	4	4

 24

Sixth Year

QUARTER 16

No.	Course	Cl.	q.h.
30.517	Intermed. Wrtg.	2	2
30.554	Shakespeare I	2	2
50.141	Meas. & Eval.	4	4

QUARTER 17

No.	Course	Cl.	q.h.
30.518	Creative Wrtg. I	2	2
30.555	Shakespeare II	2	2
	Electives	4	4

QUARTER 18

No.	Course	Cl.	q.h.
30.519	Creative Wrtg. II	2	2
30.556	Shakespeare III	2	2
	Electives	4	4

 24

Eighth Year

QUARTER 22

No.	Course	Cl.	q.h.
51.151	Student Teaching	8	

8

Total Credits

 173

therapeutic recreation services

for Nursing Home Activity Directors

Dr. Albert McCay, Consultant
Therapeutic Recreation Services
Telephone 437-3163

A certification and degree program for nursing home activity directors and others, is being offered by University College. The program is designed to meet the needs of directors of activity in the Commonwealth's nursing homes and the needs of others entering this occupational field in the future.

The part-time program, leading to certification and an Associate degree, will be taught by the distinguished faculty of Northeastern University's Boston-Bouvé College. Courses offered will be in the areas of therapeutic recreation services, the process of aging, arts and crafts, social recreation, geriatric care, utilization of resources, and many other professional courses.

CURRICULUM

- I. Certification—25 quarter hours
 - Professional courses
- II. Associate Degree—96 quarter hours
 - Psychology 2 q.h.
 - Social Sciences 8 q.h.
 - Fine Arts 3 q.h.
 - Speech & Theatre Arts 4 q.h.
 - English 2 q.h.
 - Health Care Science 8 q.h.
 - Professional 51 q.h.
 - Electives 18 q.h.

THERAPEUTIC RECREATION SERVICES**Associate in Science Degree**

Required Courses (Liberal Arts)			quarter hours	
19.501		Psychology I	2	
21.501, 21.502, 21.503		Sociology I, II, III	6	
21.563		Social Gerontology	2	
27.541		Drawing I	3	
29.501		Effective Speaking I	2	
29.511		Introduction to Theatre Arts	2	
30.601		Composition and Rhetoric I	2	19

Required Courses (Health Care Services)

86.571, 86.572, 86.573	Long-Term Care Administration I, II, III	6	
86.577	Geriatric Care I	2	8

Required Courses (Therapeutic Recreation Services)

Note: Twenty five (25) quarter hours of credit in the following professional courses will qualify a student for certification by Boston-Bouvé College:

63.501	Introduction to Therapeutic Recreation Services	2	
63.510	Philosophy of Recreation and Leisure	2	
63.521	Recreation Skills I (Social Recreation)	2	
63.522	Recreation Skills II (Music Therapy)	2	
63.523	Recreation Skills III (Guitar or Auto Harp)	2	
63.531	Techniques of Recreation Leadership	2	
63.532	Interagency Planning for Community Action	2	
63.535	Recreation Skills VI (Special Events and Programs)	2	
63.547	Outdoor Education for Handicapped	2	
63.549	The Process of Aging	2	
63.550, 63.551	Group Dynamics I, II	4	
63.552	Leadership and Program for III, Aged, and Infirm	2	
63.553	Techniques and Resources in Working with Elderly	2	
63.555	Therapeutic Recreation for Special Groups	2	
63.556	Workshop in Adapted Hospital Recreation	2	
63.557	Recreation Activities of Atypical Individuals and Groups	2	
63.560	Development and Utilization of Recreation Education Resources	2	
63.570, 63.571, 63.572	Arts and Crafts I, II, III	6	
63.592	Independent Study	3	
63.593	Independent Study	4	
63.600	Seminar in Group Dynamics	2	51

Elective Courses* **18**

Total Credits **96**

*While students may elect courses in their major field in excess of the minimum number required, they are encouraged to elect courses from any other curricula in the University College Catalog.

THERAPEUTIC RECREATION SERVICES

**Recommended Course Sequence for the 4-Year
Program Leading to the Associate in Science Degree**

	Quarter I	Quarter II	Quarter III
1st Year	Process of Aging Arts & Crafts I Group Dynamics I Intro. Ther. Rec. Services	Leadership & Prog. for III, Aged, & Infirm Arts & Crafts II Independent Study	Tech. & Resources in working w/Elderly Group Dynamics II Arts & Crafts III Independent Study
2nd Year	Sociology I Rec. Skills I Interagency Planning for Community Action Long-Term Care Admin. I	Sociology II Rec. Skills VI Comp. & Rhet. I Long-Term Care Admin. II	Sociology III Recreation Skills II Psychology I Long-Term Care Admin. III
3rd Year	Geriatric Care I Effective Speaking I Drawing I Elective (1)	Tech. of Rec. Leadership Rec. Skills III Electives (2)	Seminar in Group Dynamics Dev. & Utilization of Rec. Educ. Resources Electives (2)
4th Year	Intro. to Theatre Arts Ther. Rec. for Spec. Groups Electives (2)	Workshop In Adapted & Hosp. Recreation Social Gerontology Outdoor Educ. for Handicapped Elective (1)	Rec. Activities of Atypical Indiv. & Groups Philosophy of Rec. & Leisure Elective (1)

course descriptions

Not all the courses listed in this bulletin will be offered. A final list of those classes to be offered will be contained in the University College Schedule of Courses, which gives the hours, days and location of classes. This schedule is issued prior to the Fall, Winter, Spring, and Summer Quarters.

Abbreviations

Q.H. = Quarter Hours (credit earned)

Cl. = Hours required in class per week

Prereq. = Prerequisite

10—MATHEMATICS (Lincoln College)

Students intending to enroll in Mathematics 10.327 or 10.335 will be given a Mathematics Placement Test during the registration period. A satisfactory score on this test will entitle the student to enroll in course 10.327 or 10.335, while an unsatisfactory score will require that he enroll in the non-credit course 10.330 for additional preparation.

10.301 Introduction to Mathematics I (4cl., non-credit)

A comprehensive review of high school algebra including: first degree equations, factoring, fractions, fractional equations, ratio and proportion, word problems, and concepts of plane geometry. *Prereq. none.*

10.302 Introduction to Mathematics II (4 cl., non-credit)

Algebraic operations with complex fractions, mixed expressions, proportions, square roots, radicals, quadratic equations, simultaneous equations, graphs, and fractional zero and negative exponents. The geometry of the right triangle, areas of polygons and circles, and loci problems. Basic slide rule operation. *Prereq. 10.301.*

10.303 Introduction to Mathematics

An accelerated combination of 10.301 and 10.302. Primarily for day students.

10.307 College Algebra and Trigonometry I (4 cl., 4 q.h.)

Fundamental algebraic operations; radicals and exponents; functions; quadratic equations; variation; binomial expansion. Trigonometric functions of angles in degrees; right triangles. *Prereq. Math. Placement Test or 10.302.*

10.308 College Algebra and Trigonometry II (4 cl., 4 q.h.)

Logarithms; applications of right triangles; radian measure; trigonometric identities and equations; oblique triangles. Inequalities; complex numbers; roots of polynomial equations. *Prereq. 10.307.*

10.316 Probability and Statistics I (2 cl., 2 q.h.)

Basic tools, e.g., sets, permutations and combinations; probability and applications. *Prereq.* 10.308 or 10.329 or 10.335.

10.317 Probability and Statistics II (2 cl., 2 q.h.)

Descriptive statistics, frequency distributions and probability density functions, normal and other distributions. *Prereq.* 10.316.

10.318 Probability and Statistics III (2 cl., 2 q.h.)

Bivariate distributions, correlation, statistical inference and estimation regression. *Prereq.* 10.317.

10.320 Calculus I (4 cl., 4 q.h.)

Plane analytic geometry. Differentiation of algebraic functions. Rate, motion, maximum and minimum problems. Derivatives of higher order. Curve sketching. Basics in functions, limits, and continuity. *Prereq.* 10.308 or 10.329.

10.321 Calculus II (2 cl., 2 q.h.)

Integration of algebraic functions. Integration and differentiation of logarithmic, exponential and trigonometric terms. Calculations of areas, volumes, and length of arc by definite integrals. *Prereq.* 10.320.

10.322 Calculus III (2 cl., 2 q.h.)

Differentiation and integration of inverse trigonometric functions. Integration by parts, substitution, and tables. The Trapezoidal and Simpson Rules. The application of the differential and integral calculus to the Polar Coordinate System. Vectors in the plane. Indeterminate forms. *Prereq.* 10.321.

10.323 Calculus IV (2 cl., 2 q.h.)

Vectors in three-dimensional space. Functions of more than one variable. Partial differentiation. Multiple integration. Infinite series. Taylor's and MacLaurin's Formula. *Prereq.* 10.322.

10.324 Differential Equations I (2 cl., 2 q.h.)

Vector analysis; matrices and linear algebra. *Prereq.* 10.323.

10.325 Differential Equations II (2 cl., 2 q.h.)

Ordinary differential equations — standard types of the first order; linear differential equations, especially with constant coefficients. Variation of parameters. *Prereq.* 10.324.

10.326 Differential Equations III (2 cl., 2 q.h.)

Series solutions of differential equations; Laplace transforms; Fourier series and orthogonal functions. *Prereq.* 10.325.

10.327 Mathematics I (2 cl., 2 q.h.)

Methods and applications of algebra, graphical techniques. *Prereq.* Math. Placement Test, 10.331 or 10.302.

10.328 Mathematics II (2 cl., 2 q.h.)

Linear and quadratic equations, exponents and radicals, variation. *Prereq.* 10.327.

10.329 Mathematics III (2 cl., 2 q.h.)

Review of geometry; topics of trigonometry, introduction to statistics and probability, logarithms. *Prereq.* 10.328.

10.330 Basic Mathematics I (2 cl., non-credit)

A review of elementary algebra; algebraic expressions and operations, equations, word problems. *Prereq.* none.

10.331 Basic Mathematics II (2 cl., non-credit)

Further review; operations with polynomials, factoring, fractional expressions, word problems. *Prereq.* 10.330.

10.332 Mathematics for Business Management I (2 cl., 2 q.h.)

Introduction to mathematics underlying operations research, with emphasis on applications to business management logic, set theory. *Prereq.* 10.329 or equiv.

10.333 Mathematics for Business Management II (2 cl., 2 q.h.)

Probability and its uses in decision-making under uncertainty; introduction to vector and matrix algebra. *Prereq.* 10.332 or equiv.

10.334 Mathematics for Business Management III (2 cl., 2 q.h.)

Mathematics of finance, linear programming and optimization techniques, game theory. *Prereq.* 10.333 or equiv.

10.351 Advanced Mathematics I (Numerical Analysis) (2 cl., 2 q.h.)

Basic methods of numerical analysis — roots by iteration; approximating polynomials and interpolation; least squares fitting; numerical integration; approximate solution of ordinary differential equations — problems employing the electronic computer. *Prereq.* 09.353 and 10.326.

10.352 Advanced Mathematics II (2 cl., 2 q.h.)

Introduction to partial differential equations, boundary-value problems, Sturm-Liouville systems. *Prereq.* 10.351.

10.353 Advanced Mathematics III (2 cl., 2 q.h.)

Special topics in analysis. *Prereq.* 10.352.

10.361 Modern Algebra I (2 cl., 2 q.h.)

Sets; binary operations; mappings; rings, integers, fields; rationals; reals, bases for computer applications; Euclidean algorithm; primes. *Prereq.* 10.308, 10.329 or 10.335.

10.362 Modern Algebra II (2 cl., 2 q.h.)

Field of complex number; groups; subgroups; polynomial rings; homomorphisms; isomorphisms; ideals. *Prereq.* 10.361.

10.363 Modern Algebra III (2 cl., 2 q.h.)

Vector spaces; linear transformations; dependence, independence; dimension applications to engineering, science, and business. *Prereq.* 10.362.

10.364 Modern Applied Algebra (4 cl., 4 q.h.)

Introduce the language of abstract algebra to the following topics: graphs, finite state machines, programming languages, Boolean Algebra, lattices, coding for communication channels and radar. Look at algebraic theory of linear systems. *Prereq.* 10.361, 10.362 and 10.363.

10.391 Mathematics — A (3 cl., 3 q.h.)

Methods and applications of algebra; graphical techniques. Linear and quadratic; exponents and radicals. (No credit to students who have passed 10.327, or 10.328, or 10.335). *Prereq.* *Math. Placement Test*, 10.302, or 10.331.

10.392 Mathematics — B (3 cl., 3 q.h.)

Variation; review of geometry; topics of trigonometry; introduction to statistics and probability; logarithms. (No credit to students who have passed 10.329.) *Prereq.* 10.391.

10.401 Foundations of Mathematics I (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153.)

10.402 Foundations of Mathematics II (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153.)

10.403 Foundations of Mathematics III (2 cl., 2 q.h.)

(See General Interest Courses, pages 152-153.)

10.421 Calculus — A (4 cl., 4 q.h.)

Applications of derivatives to curve-sketching; antidifferentiation; the definite integral, with applications; calculus of non-algebraic functions — logarithmic, exponential, and trigonometric. Calculus of inverse trigonometric functions; techniques of integration; polar coordinates; the conic sections; vectors in a plane; indeterminate forms, L'Hospital's rule. *Prereq.* 10.320.

10.422 Calculus — B (3 cl., 4 q.h.)

Calculus of functions of several variables, partial differentiation, multiple integrals, infinite series. Vector analysis; matrices and linear algebra. *Prereq.* 10.421.

10.423 Differential Equations (4 cl., 4 q.h.)

Ordinary differential equations — standard types of the first order; linear differential equations, especially with constant coefficients; Laplace transforms, series solutions of differential equations. Fourier series and orthogonal functions. *Prereq.* 10.422.

11—PHYSICS (Lincoln College)**11.301 Introductory Physics I** (4 cl., non-credit)

A survey of physical principles and theories related to field of mechanics. Emphasis is placed upon the solution of applied problems. *Prereq.* None.

11.302 Introductory Physics II (4 cl., non-credit)

Extension of principles in mechanics and introduction of concepts in heat, sound, light, electricity, and magnetism. *Prereq.* 11.301.

11.304 General Physics I (2 cl., 2 q.h.)

Survey of Newtonian mechanics; kinematics and dynamics of particle motion; projectile and circular motion; rotational motion; conservation laws of energy and momentum. *Prereq.* 10.501 or concurrently.

11.305 General Physics II (2 cl., 2 q.h.)

Temperature; heat energy; mechanical equivalent of heat; wave motion; sound; Doppler's effect; properties of light; simple optical systems. *Prereq.* 11.304.

11.306 General Physics III (2 cl., 2 q.h.)

Fundamentals of electricity and magnetism; fields; potential; electric current; inductance; capacitance; electromagnetism; a-c and d-c series circuits. *Prereq.* 11.305.

12—CHEMISTRY

Consultant: Prof. K. Weiss, Chairman, Chemistry Dept. (L.A. College)

Course Coordinator: Prof. F. Boig, (L.A. College)

12.501 Introductory Chemistry I (4 cl., non-credit)

A non-mathematical approach to the concepts of chemistry including matter, elements and compounds, chemical bonding, chemical equations. *Prereq.* None.

12.502 Introductory Chemistry II (4 cl., non-credit)

A continuation of 12.501, including periodic system, forms of energy, oxidation reduction, solutions, chemical and ionic equilibrium, nuclear reactions, and a brief introduction to organic chemistry. *Prereq.* 12.501 or equiv.

12.507 Modern Chemistry I (Intro. to Inorganic Chemistry) (2 cl., 2 q.h.)

Fundamental ideas of matter and energy, chemical bonding, chemical energy, water and solutions, colloids, ionic reactions, oxidation and reduction, acidity, radioactivity; all discussed from the viewpoint of recent developments.

12.508 Modern Chemistry II (Intro. to Organic Chemistry), (2 cl., 2 q.h.)

Classes of organic compounds, including hydrocarbons, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines and amides, carbohydrates; including their relationships with modern biology. *Prereq.* 12.507 or equiv.

12.509 Modern Chemistry III (Intro. to the Chemistry of Living Bodies) (2 cl., 2 q.h.)

Includes fats, proteins, enzymes, chemistry of digestion, and the chemical reactions characteristic of body fluids. *Prereq.* 12.508 or equiv.

12.515 Biochemistry I (2 cl., 2 q.h.)

The first quarter of a three-quarter course sequence. The sequence will cover introduction to the biochemistry of the cell, including the occurrence, chemistry, and metabolism of carbohydrates, lipids, proteins, and nucleic acids. *Prereq.* 12.533 or equiv.

12.516 Biochemistry II (2 cl., 2 q.h.)

Continuation of Biochemistry I. *Prereq.* 12.515 or equiv.

12.517 Biochemistry III (2 cl. 2 q.h.)

Continuation of Biochemistry II. *Prereq.* 12.516 or equiv.

12.518 Modern Chemistry Laboratory 1 (2 lab, 1 q.h.)

Coordinated with the lecture course, Modern Chemistry I, and deals with the preparation, properties, and reactions of substances discussed. *Prereq.* 12.507 taken concurrently. (Laboratory fee)

12.519 Modern Chemistry Laboratory II (2 lab, 1 q.h.)

Coordinated with the lecture course, Modern Chemistry II, and deals with the preparation, properties, and reactions of substances discussed. *Prereq.* 12.518 (or 12.508 taken concurrently). (Laboratory fee)

12.520 Modern Chemistry Laboratory III (2 lab, 1 q.h.)

Coordinated with the lecture course, Modern Chemistry III. *Prereq.* 12.519 (or 12.509 taken concurrently). (Laboratory fee)

12.521 Analytical Chemistry I (2 cl., 2 q.h.)

Analytical procedures and techniques. The principles of solution chemistry, ionic equilibria, and oxidation potentials applied to solving problems in chemical analysis. *Prereq.* 12.546 and 12.549 or equiv.

12.522 Analytical Chemistry II (2 cl., 2 q.h.)

Principles and practice of gravimetric and titrimetric methods of analysis. *Prereq.* 12.521 or equiv.

12.523 Analytical Chemistry III (2 cl., 2 q.h.)

Theory of spectrophotometry, chromatography, and selected electroanalytical methods. *Prereq.* 12.522 or equiv.

12.524 Analytical Chemistry Laboratory I (3 lab, 2 q.h.)

Qualitative analysis. Separations by chemical means, chemical tests, and spot tests for inorganic ions in solution. *Prereq.* 12.521 or concurrently or equiv. (Laboratory fee)

12.525 Analytical Chemistry Laboratory II (3 lab, 2 q.h.)

Chemical methods of quantitative analysis. Procedures and techniques of gravimetric and volumetric methods of chemical analysis. *Prereq.* 12.522 or concurrently, or equiv. (Laboratory fee)

12.526 Analytical Chemistry Laboratory III (3 lab, 2 q.h.)

Instrumental methods of analysis. Instruments and procedures for electrometric and optical methods of chemical analysis. *Prereq.* 12.525 and 12.523 or concurrently, or equiv. (Laboratory fee)

12.527 Analytical Chemistry. (Lectures and laboratory, 4 q.h., summer term only) Survey of principles and theories of volumetric, gravimetric, and instrumental analysis. Application made in the laboratory with analyses of unknown samples. *Prereq.* General Chemistry or its equivalent.

12.531 Organic Chemistry I (2 cl., 2 q.h.)

Nature of carbon in organic compounds. General principles of structure, nomenclature, preparation, uses, and reactions, of aliphatic hydrocarbons: alkanes, alkenes, alkynes, dienes, cycloalkanes. Position and geometric isomerism. Introduction to free radical and ionic mechanisms of reactions. *Prereq.* 12.546 and 12.549 or equiv.

12.532 Organic Chemistry II (2 cl., 2 q.h.)

Structure of benzene, electrophilic aromatic substitution reactions. General principles of structure, nomenclature, preparation, uses, and reactions of the various types of organic compounds, including: alcohols, alkyl and aryl halides, ethers and epoxides, and carboxylic acids. Optical isomerism and introductory chemical kinetics will be discussed. *Prereq.* 12.531 or *equiv.*

12.533 Organic Chemistry III (2 cl., 2 q.h.)

Continuation of Chemistry 12.532 with emphasis on the application of chemical conversions to synthetic problems. Functional derivatives of carboxylic acids, sulfonic acids and their derivatives, amines, diazonium compounds, phenols, aldehydes, and ketones. *Prereq.* 12.532 or *equiv.*

12.534 Organic Chemistry Laboratory I (3 lab, 2 q.h.)

Co-ordinated with the lecture course, Organic Chemistry I, and deals with the preparation and properties of compounds discussed. *Prereq.* 12.546 or *equiv.* and 12.531 or *concurrently*, or *equiv.* (Laboratory fee)

12.535 Organic Chemistry Laboratory II (3 lab, 2 q.h.)

Coordinated with the lecture course, Organic Chemistry II, and deals with the preparation and properties of compounds discussed. *Prereq.* 12.534 or *equiv.* (Laboratory fee)

12.536 Organic Chemistry Laboratory III (3 lab, 2 q.h.)

Coordinated with the lecture course, Organic Chemistry III, and deals with the preparation and properties of compounds discussed. *Prereq.* 12.535 or *equiv.* (Laboratory fee)

12.541 Physical Chemistry I (2 cl., 2 q.h.)

The three states of matter, atomic and molecular forces, physical properties and molecular structure; heat, work, and heat capacity; thermochemistry. *Prereq.* 10.323, 11.306, and 12.546 plus 12.549 or *equiv.*

12.542 Physical Chemistry II (2 cl., 2 q.h.)

Thermodynamics, solutions, chemical equilibria, phase diagrams, and chemical kinetics. *Prereq.* 12.541 or *equiv.*

12.543 Physical Chemistry III (2 cl., 2 q.h.)

Electrical conductance, electromotive force, ionic equilibria, colloids, quantum theory, and photochemistry. *Prereq.* 12.542 or *equiv.*

12.544 General Chemistry I (2 cl., 2 q.h.)

Fundamental concepts; symbols, formulas, and equations; atomic structure and Periodic Law, chemical bonding; oxygen, ozone, and hydrogen; the gaseous state and gram mole volume; the liquid and solid states; water and hydrogen peroxide. *Prereq.* 10.327 or *equiv.* or *concurrently.* (Not open to those students with credit for 12.311 or 12.314.)

12.545 General Chemistry II (2 cl., 2 q.h.)

Solutions, solutions of electrolytes, colloids, oxidation and reduction reactions, periodic properties, halogens, chemical equilibrium, electrochemistry; acids, bases, and salts; sulfur family. *Prereq.* 12.544, or *equiv.* (Not open to those students with credit for 12.312 or 12.315.)

12.546 General Chemistry III (2 cl., 2 q.h.)

Ionic equilibrium and weak electrolytes; solubility product principle, hydrolysis. Nitrogen, phosphorus, and their compounds; boron, silicon, and their compounds; alkali and alkaline earth metals, metals of groups III and IV. Nuclear chemistry. Carbon and its compounds. Biochemistry. *Prereq.* 12.545, or equiv. (Not open to students with credit for 12.313 or 12.316.)

12.547 General Chemistry Laboratory I (2 lab, 1 q.h.)

Coordinated with the lecture course, General Chemistry I, and deals with the preparation and properties of elements and compounds discussed. *Prereq.* 12.544 or concurrently or equiv. (Not open to those students with credit for 12.314.) (Laboratory fee)

12.548 General Chemistry Laboratory II (2 lab, 1 q.h.)

Coordinated with the lecture course, General Chemistry II, and deals with the preparation and properties of elements and compounds discussed. *Prereq.* 12.547, or equiv. (Not open to those students with credit for 12.315.) (Laboratory fee)

12.549 General Chemistry Laboratory III (2 lab, 1 q.h.)

Qualitative analysis experiments, including unknown solutions. *Prereq.* 12.548 or equiv. (Not open to those students with credit for 12.316.) (Laboratory fee)

12.550 Chemistry for the Citizen. (2 cl., 2 q.h.)

The objective of the course is to give the non-science student an appreciation and some knowledge of the role of chemistry in our technological society and in our everyday lives. To provide background for subsequent discussion, important laws and theories relating to matter and its transformations will be reviewed. There will then follow discussion of the chemistry of such basic human needs as food, clothing, shelter, transportation, and energy production. Other topics may be included or substituted, since students will participate in the selection of subjects for discussion. *Prereq.* none.

12.551 Instrumental and Radiochemistry I (2 cl., 2 q.h.)

Definitions, physical principles, scope and application; principles of measurement; endpoint-detection systems for volumetric analysis, data treatment and interpretation. Optical methods of analysis including spectrophotometry, excitation methods, measurements of other optical properties, and mass spectrometry. *Prereq.* 12.523 or equiv.

12.552 Instrumental and Radiochemistry II (2 cl., 2 q.h.)

Methods of separation, vapor phase chromatography, ion exchangers; electrical methods of analysis including potentiometry, voltammetry, coulometry, and conductimetry; miscellaneous instrumental measurements. *Prereq.* 12.551 or equiv.

12.553 Instrumental and Radiochemistry III (2 cl., 2 q.h.)

Radioactivity and nuclear reactions, production and study of nuclear reactions, equations of radioactive decay, nuclear states and radioactive processes, interaction of radiation with matter, radiation detection and measurement, statistics of radioactivity measurements, techniques for the study of radio-nuclides, tracers in chemical applications and nuclear energy. *Prereq.* 12.552 or equiv.

12.554 Physical Chemistry Laboratory I (3 cl., 2 q.h.)

Experimental studies of viscosity, thermochemistry, and homogeneous equilibrium. *Prereq.* 12.542 or concurrently or equiv. (Laboratory fee)

12.555 Physical Chemistry Laboratory II (3 cl., 2 q.h.)

Experimental studies of phase equilibrium, solution thermodynamics and chemical kinetics. *Prereq.* 12.554 or equiv. (Laboratory fee)

16—EARTH SCIENCE

Consultant: Prof. D. Wilmarth, Earth Sciences (L.A. College)

16.501 Introduction to Earth Sciences I (2 q.h.)

The nature and role of the sciences of the Earth; the investigations that have provided information of the Earth as an object in space; our conceptions of the dynamic nature of the Earth. *Prereq.* none.

16.502 Introduction to Earth Science II (2 q.h.)

The issue of energy; the significance of energy for the dynamics of the Earth's atmosphere, oceans, and land surfaces. *Prereq.* 16.501 or equiv.

16.503 Introduction to Earth Science III (2 q.h.)

The complex activities of the Earth's crust; the consequences of crustal dynamics, both internally and externally; the history of the dynamics of crustal activity; the origin of the earth; structure and origin of the Solar System; the components of the Universe. *Prereq.* 16.502 or equiv.

16.504 Earth Science (Intensive) (6 q.h.)

A composite of 16.501, 16.502, 16.503 as a one quarter course. *Prereq.* none.

16.505 Earth Science A (3 qh.)

A composite of 16.501 and the first half of 16.502. *Prereq.* none.

16.506 Earth Science B (3 q.h.)

The second half of 16.502 and all of 16.503. *Prereq.* 16.505.

16.511 History of Science and Technology I (2 q.h.)

An analysis of the varieties of cultures and civilizations from primitive man to the Roman Empire, emphasizing the interrelationships of science, technology, and society. *Prereq.* 16.503 or equiv.

16.512 History of Science and Technology II (2 q.h.)

A continuation of History of Science and Technology I covering the period from the Roman Empire to Sir Isaac Newton. *Prereq.* 16.511.

16.513 History of Science and Technology III (2 q.h.)

A continuation of History of Science and Technology II covering the period from Sir Isaac Newton to the present. *Prereq.* 16.512.

16.521 Introduction to Geology (2 q.h.)

Introduction to fundamental concepts of the earth and its crust. Consideration of the nature and properties of the materials composing the earth; the areal distribution of these materials, and the processes by which they are formed, altered, transported, and deposited; and the nature and development of the landscape. *Prereq.* 16.503 or equiv.

16.522 Economic Mineralogy (2 q.h.)

Introduction to the geological occurrence, mineralogy, use and economics of the more important metallic and non-metallic minerals in the world today. International mineral problems will be discussed. *Prereq.* 16.503 or equiv.

16.523 Gemology (2 q.h.)

Introduction to the precious and semiprecious minerals of the earth's crust. Techniques of gem cutting, polishing, and faceting will be discussed in detail. Opportunity will be available to view and handle actual gem stones. *Prereq.* 16.503 or equiv.

16.531 Oceanology I (formerly Oceanography I) (2 q.h.)

Introduction to the origin of the global ocean; the physical and chemical properties of sea water; development of ocean currents and their effect on land masses of the world; problems of ocean pollution. *Prereq.* 16.503 or equiv.

16.532 Oceanology II (formerly Oceanography II) (2 q.h.)

The habitat zones and organisms of the sea; Phytoplankton, zooplankton, and nekton; economic importance of marine resources for expanding world population. *Prereq.* 16.531 or equiv.

16.533 Oceanology III (formerly Marine Geology) (2 q.h.)

Physiography and structure of ocean basins; marine geological processes and features; sedimentation, erosion, shorelines, and bottom topography; methods and techniques of marine geological explorations. *Prereq.* 16.532 or equiv.

16.534 Fisheries Oceanography I (2 q.h.)

Survey of commercially important marine organisms; life and distribution of commercially important seaweed, shellfish, and fishes; population dynamics and fishery potential of the world's oceans; analysis of fishery stocks and sea farming. *Prereq.* 16.533 or equiv.

16.535 Fisheries Oceanography II (2 q.h.)

Examination of fishery methods and techniques around the world; recent technological advancement. *Prereq.* 16.534 or equiv.

16.536 Fisheries Oceanography III (2 q.h.)

Commercial products and applications of marine organisms; special emphasis on marine products of commerce from the New England area; chemical, industrial, and dietary applications of marine products. *Prereq.* 16.535 or equiv.

16.537 Marine Resources I (2 q.h.)

Quantitative and qualitative consideration of energy from the marine environment; current technological developments in the use of tidal power, off-shore oil, natural gas, thermal and nuclear energy from the sea. *Prereq.* 16.533 or equiv.

16.538 Marine Resources II (2 q.h.)

Food resources of the sea; analysis of world marine food production; marine food technology, conservation, and mariculture. *Prereq.* 16.537 or equiv.

16.539 Marine Resources III (2 q.h.)

Coastal zone recreational resources: beaches, artificial fishing reefs; shore erosion; SCUBA, boating, sailing, angling and surfing. *Prereq.* 16.538 or equiv.

16.551 Principles of Astronomy I (2 q.h.)

The nature and scope of astronomy; the geocentric universe; the heliocentric universe; celestial reference systems; time and the calendar; the sun-moon earth system; astronomical instruments. *Prereq.* 16.503 or *equiv.*

16.552 Principles of Astronomy II (2 q.h.)

The solar system; the inner planets; the outer minor planets; the outer major planets; the telescopic planets; the asteroid belt; meteors; comets; the sun as a source of energy and center of organization. *Prereq.* 16.551 or *equiv.*

16.553 Principles of Astronomy III (2 q.h.)

The triangulation of space; stellar population; star color and motion; star systems; stellar evolution; galaxies. *Prereq.* 16.552 or *equiv.*

16.554 Observational Astronomy (3 q.h.)

An introduction to the planets, stars, and constellations that are visible to the naked eye. Lectures, the planetarium, and actual viewing sessions are all used during the course. Primary emphasis will be placed on those stars and constellations easily seen from mid-northern latitudes.

16.557 Celestial Astronomy I (2 q.h.)

A thorough examination of the sun as a typical star; determination of stellar physical properties—the instrumentation and the information: size, mass, density; chemical composition, surface temperature, rotation, axial tilt, distance. *Prereq.* 16.553 or *equiv.*

16.558 Celestial Astronomy II (2 q.h.)

Star systems—the visual, telescopic, and spectroscopic doubles; simple star systems; stellar populations; H-R diagrams and stellar evolution; multiple stars; irregular stars; nova; nebulae. *Prereq.* 16.557 or *equiv.*

16.559 Celestial Astronomy III (2 q.h.)

Galactic detection; galactic distribution; forms, types, and possible galactic evolution; the MILKY WAY; inter-stellar and intergalactic space; pulsars, quasars, and black holes; cosmology. *Prereq.* 16.558 or *equiv.*

16.561 Physical Geography I (2 q.h.)

Physical assessment of the earth as a spheroid; relations with the sun; geographic grid; map projections; illumination of the globe; geographic time studies and moon-tide relationships. *Prereq.* 16.503 or *equiv.*

16.562 Physical Geography II (2 q.h.)

Physical weather elements—temperature, pressure, moisture; cyclonic storms; role of weather elements in world climate. *Prereq.* 16.561 or *equiv.*

16.563 Physical Geography III (2 q.h.)

The earth's landforms—their formation and description; particular emphasis given to the agents of deposition and erosion: the volcano, the river, the glacier, and ocean waves. *Prereq.* 16.562 or *equiv.*

16.567 Human and Cultural Geography (2 q.h.)

Spatial analysis of people throughout the world—their culture, cultural landscapes, cultural history, and cultural ecology; provides for an understanding of differences in world populations. *Prereq.* 16.563 or *equiv.*

16.568 Urban Geography I (2 q.h.)

In-depth analysis of historical and present structure of cities; comparative world urbanism trends; historic city growth patterns; morphology; site and situations; central place theories; external and internal relations; economic base. *Prereq.* 16.567 or equiv.

16.569 Urban Geography II (2 q.h.)

An applied approach to urban problems through urban theories and planning techniques; vertical classification of cities; methods of city development; land utilization; land-use survey and mapping techniques; planning approaches; zoning. *Prereq.* 16.568 or equiv.

16.571 Conservation I (2 q.h.)

Philosophy of conservation; historical development of the conservation movement in the U.S. since 1900; interactions of economics and conservation practices. *Prereq.* 16.503 or equiv.

16.572 Conservation II (2 q.h.)

Problems relating to the supply, use, and management of major renewable natural resources: forests, soil, wildlife, and water. *Prereq.* 16.571 or equiv.

16.573 Conservation III (2 q.h.)

Application of the theories and techniques of conservation; problems of urban resources; air and water pollution; recreational resources; the availability of funds. *Prereq.* 16.572 or equiv.

16.574 Conservation and the Nation (2 q.h.)

In-depth study of the current practices and problems in our nation; mineral resources availability and allocation; energy resources; atmospheric, fresh and salt water pollution; wildlife and endangered species. *Prereq.* 16.573 or equiv.

16.575 Conservation and the Community (2 q.h.)

Examination of the conservation problems at the local level; identification of the problem; the factors involved; the dimension of the problem; the responsibility of the community. *Prereq.* 16.574 or equiv.

16.576 Conservation Management (2 q.h.)

Assessment of current practices of the local community; sources of knowledge and assistance among the populace; agencies available to the community; nature and scope of practices needed; practicality of community action. *Prereq.* 16.575 or equiv.

16.577 Environmental Conservation I (2 q.h.)

Identification of the natural resources of the land; history of the discovery and use of natural land resources; the scientific, social, and political uses of natural resources. *Prereq.* 16.573 or equiv.

16.578 Environmental Conservation II (2 q.h.)

The physical, chemical, and biological significance of the atmosphere; factors that are removed, added or altered; the economic practices of the urban, suburban, and rural communities; modern methods of detection of atmospheric pollutants; modern techniques and practices designed to deal with the problem. *Prereq.* 16.577 or equiv.

16.579 Environmental Conservation III (2 q.h.)

An in-depth analysis of the natural resources of the ocean; reclamation of soil; detection and procurement of mineral resources—especially metals and fuel materials; chemical and thermal pollution problems; the biotic resources and their conservation. *Prereq.* 16.578 or *equiv.*

16.580 Economic Geography I (2 q.h.)

Theoretical approach and case study examination of spatial manifestations of the economy; spatial models and systems; the economic landscape. *Prereq.* 16.563 or *equiv.*

16.581 Economic Geography II (2 q.h.)

Continuation of 16.580—the locational determinants of services, trade, finance, and insurance; transportation and communications; manufacturing, construction, and the extractive industries. *Prereq.* 16.580 or *equiv.*

16.582 Applied Climatology (2 q.h.)

Climatic effects on man—his agricultural and economic activities; macroclimatology and microclimatology in rural, suburban and urban situations; short and long range extremes and their climatological consequences. *Prereq.* 16.581 or *equiv.*

18—BIOLOGY

Consultant: Prof. F. D. Crisley, Chairman, Biology Dept. (L.A. College)

Course Coordinator: Prof. F. A. Rosenberg (L.A. College)

18.507 Gross Anatomy and General Physiology I (2 cl., 2 q.h.)

Fundamental concepts of living organisms, chemical and biological characteristics of cellular metabolism. The skeletal system and its appendages. General nomenclature, anatomical names and terms. *Prereq.* none.

18.508 Gross Anatomy and General Physiology II (2 cl., 2 q.h.)

The systems of the body and the relationships between them. The structure and function of each. *Prereq.* 18.507 or *equiv.*

18.509 Gross Anatomy and General Physiology III (2 cl., 2 q.h.)

Continuation of the systems of the body and the relationship between them. *Prereq.* 18.508 or *equiv.*

18.511 Biology I (General) (3 cl., 3 lab., 4 q.h.)

Universal properties and processes of living organisms. Cellular composition and cellular activities; inheritance and cellular control. *Prereq.* none. (Laboratory fee)

18.512 Biology II (Animal) (3 cl., 3 lab., 4 q.h.)

Functional anatomy of animal organ systems, their interactions and environmental relationships. *Prereq.* 18.511 or *equiv.* (Laboratory fee)

18.513 Biology III (Animal) (3 cl., 3 lab., 4 q.h.)

Systematic comparative study of the structure and functions of animals. Diversity of animals considered from the standpoint of evolutionary adaptation. *Prereq.* 18.512 or *equiv.* (Laboratory fee)

18.519 Plant Biology (3 cl., 3 lab., 4 q.h.)

Systematic study of the structure and function of plants, principally vascular plants. Survey of the plant-like protists, and monerans. *Prereq.* 18.511 or equiv. (Laboratory fee)

18.520 Medical Microbiology (2 cl., 4 lab., 4 q.h.)

Major characteristics of disease-producing organisms. *Prereq.* A formal course or professional laboratory experience in bacteriology. (Laboratory fee)

18.521 Microbiology I (2 cl., 4 lab., 4 q.h.)

Morphology and biochemistry of the bacteria. *Prereq.* 18.513 or equiv. (Laboratory fee)

18.522 Microbiology II (2 cl., 4 lab., 4 q.h.)

Survey of pathogenic microorganisms. *Prereq.* 18.521 or equiv. (Laboratory fee)

18.523 Microbiology III (2 cl., 4 lab., 4 q.h.)

Biology of the protista; the role of microorganisms in the environment and industry. *Prereq.* 18.522 or equiv. (Laboratory fee)

18.524 Human Anatomy and Physiology I (2 cl., 2 lab., 3 q.h.)

Introduction to human anatomy, osteology, anatomy of the muscular system, respiratory system, digestive system, the vascular system, urogenital system. The laboratory includes a study of human bone and cat dissection. *Prereq.* 18.506 or 18.513 or equiv. (Laboratory fee)

18.525 Human Anatomy and Physiology II (2 cl., 2 lab., 3 q.h.)

Principles of physiology and continuation of the study of human anatomy. The laboratory is mainly concerned with muscle physiology. *Prereq.* 18.524 or equiv. (Laboratory fee)

18.526 Human Anatomy and Physiology III (2 cl., 2 lab., 3 q.h.)

Continuation of the principles of physiology. The anatomy and physiology of the nervous system, physiology of the endocrine system. The laboratory deals with physiology of respiration and the physiology of blood. *Prereq.* 18.525 or equiv. (Laboratory fee)

18.530 Horticulture (3 q.h.)

The study of the science and art of plants, stressing the use of plants in the home and community. *Prereq.* none. (Laboratory fee)

18.531 Cell Biology I (2 cl., 2 q.h.)

Chemical composition of cells, structure of cells and organelles, transport processes, cell motion and excitability, growth. *Prereq.* 18.513, 18.556, 18.558 and 12.533 or equiv.

18.532 Cell Biology II (2 cl., 2 q.h.)

Cellular energy supply, enzyme function, respiration and metabolism, photosynthesis and other synthetic pathways, control of cellular processes. *Prereq.* 18.531 or equiv.

18.533 Cell Biology III (4 cl., 2 q.h.)

Laboratory techniques in cell biology; microscopy, structure and chemical composition of cells, enzyme measurements, photosynthesis, respiration, active transport, growth. *Prereq.* 18.532 or equiv. (Laboratory fee)

18.535 Advanced Horticulture (3 q.h.)

Prereq. 18.530. (Laboratory fee)

18.551 Histology-Organology I (1 cl., 2 lab., 2 q.h.)

The morphology of cells and tissues. *Prereq.* 18.513 or equiv. (Laboratory fee)

18.552 Histology-Organology II (1 cl., 2 lab., 2 q.h.)

The tissue components of the integumentary, digestive, and respiratory systems. *Prereq.* 18.551 or equiv. (Laboratory fee)

18.553 Histology-Organology III (1 cl., 2 lab., 2 q.h.)

The tissue components of the cardiovascular, excretory, reproductive, and endocrine systems. *Prereq.* 18.552 or equiv. (Laboratory fee)

18.556 Genetics Laboratory (4 lab., 2 q.h.)

Laboratory exercises involving Principles of Mendelian inheritance, linkage, crossing-over. Classical genetics utilizing *Drosophila*; biochemical studies utilizing *Neurospora*. *Prereq.* 18.558 or equiv. (Laboratory fee)

18.557 Genetics I (2 cl., 2 q.h.)

Mitosis, meiosis, and mendelian genetics. *Prereq.* 18.513 or equiv.

18.558 Genetics II (2 cl., 2 q.h.)

Chromosome mapping, mutations, translocation, chromosomal aberrations. *Prereq.* 18.557 or equiv.

18.561 Ecology I (2 cl., 2 q.h.)

Environmental factors. The soil system. Water. The atmosphere. Temperature, light, wind, pressure. The physico-chemical factors — CO₂, N and mineral nutrients. Habitat. Distribution of plants and animals in the world according to temperature and precipitation. *Prereq.* 18.513 or equiv.

18.562 Ecology II (2 cl., 2 q.h.)

The ecosystem. Ecological niche. The producers, consumers, and decomposers. The pond ecosystem, desert ecosystem, forest ecosystem, and sea shore ecosystem. Energy cycle and efficiency of energy utilization. Mass, weight, and energy pyramids. *Prereq.* 18.561 or equiv.

18.563 Ecology III (2 cl., 2 q.h.)

Population ecology. Biotic community. Population growth. Relations between the species. Symbiosis. Competition. Predation. Succession. *Prereq.* 18.562 or equiv.

18.564 Man and His Biosphere I (2 cl., 2 q.h.)

An ecological analysis of the human situation and man's interaction with other organisms. The necessary foundation of biological principles will be presented.

18.565 Man and His Biosphere II (2 cl., 2 q.h.)

A continuation of Man and his Biosphere I. *Prereq.* 18.564 or equiv.

19—PSYCHOLOGY

Consultant: Prof. M. Terman, Chairman, Psychology Dept. (L.A. College)

Associate Consultant: Prof. H. S. Zamansky (L.A. College)

19.501 Psychology I (2 q.h.)

An introductory survey of the historical backgrounds of psychology, psychological measurement and testing, and principles of animal and human learning.

19.502 Psychology II (2 q.h.)

Principles of sensory processing, perception, motivation and emotion, and social influences on behavior. *Prereq.* 19.501 or equiv.

19.503 Psychology III (2 q.h.)

Personality theory and measurement, behavior disorders, mental health and psychotherapy. *Prereq.* 19.502 or equiv.

19.504 Statistics in Psychology I (2 q.h.)

Scales of measurement in psychological research, measures of central tendency, and variability. *Prereq.* 19.503 or equiv.

19.505 Statistics in Psychology II (2 q.h.)

Measures of correlation, introduction to probability and statistical distributions. *Prereq.* 19.504 or equiv.

19.506 Statistics in Psychology III (2 q.h.)

Parametric and non parametric tests of significance, including chi square, t-test, F test, and simple analysis of variance. *Prereq.* 19.505.

Note: 19.504, 19.505, and 19.506 may not be taken in addition to Statistics (39.511, 39.512, 39.513). Psychology majors may substitute 39.511, 39.512, and 39.513 with permission of the Dean.

19.507 Psychology (Intensive) (6 q.h.)

An introductory survey of the historical backgrounds of psychology, psychological measurements and testing, and principles of animal and human learning. Principles of sensory processing, perception, motivation and emotion, and social influences on behavior. Personality theory and measurement, behavior disorders, mental health, and psychotherapy. (Not open to students who have taken 19.501, 19.502, 19.503.)

19.508 Fundamentals of Psychology I (4 q.h.)

Basic concepts from most areas of psychological investigation; the experimental orientation to the study of behavior, including child development, individual differences, learning, and social psychology. (Recommended for psychology majors.) (Not open to students who have credit for 19.501, 502, 503.)

19.509 Fundamentals of Psychology II (4 q.h.)

The sensory basis of behavior, cognition, perception, motivation, emotions, normal and abnormal personality. (Recommended for psychology majors.) *Prereq.* 19.508 or equiv. (Not open to students who have credit for 19.501, 502, 503.)

19.511 Child Psychology I (2 q.h.)

Genetic factors in development; biological, social, intellectual, and personality development during preschool years. *Prereq.* 19.503 or *equiv.*

19.512 Child Psychology II (2 q.h.)

Factors in psychological development during the middle-childhood years. *Prereq.* 19.511.

19.513 Adolescent Psychology (2 q.h.)

Psychological and physical changes during adolescence, attitudes toward peer groups and parental figures, vocational choice, and the determination of moral standards and values. *Prereq.* 19.512 or *equiv.*

19.521 Personality I (2 q.h.)

Systematic study of the normal personality. A number of prominent theoretical approaches to personality will be considered including the psychoanalytic, constitutional, field, and behavioral-response. *Prereq.* 19.503 or *equiv.*

19.522 Personality II (2 q.h.)

Problems of adjustment, frustration, conflict, and stress. Adjustive behavior, mechanisms of defense, and minor personality maladjustments will be considered. *Prereq.* 19.521 or *equiv.*

19.523 Motivation (2 q.h.)

Survey of the various aspects of motivation. Such areas as primary and secondary reinforcement, unconscious motivation, effectance motivation, and the assessment of motive will be considered. *Prereq.* 19.522 or *equiv.*

19.524 Social Psychology I (2 q.h.)

The socialization process, social motives, interpersonal perception, group membership and structure. *Prereq.* 19.503 or *equiv.*

19.525 Social Psychology II (2 q.h.)

Attitudes, prejudice and ethnic relations, leadership, mass behavior and social movements, and the effects of mass media of communication. *Prereq.* 19.524 or *equiv.*

19.526 Psychology of Aggression (2 q.h.)

The role of aggressive and violent behavior in man and lower organisms. The contribution of both learned responses and genetic constitution. *Prereq.* 19.503 or *equiv.*

19.527 Psychology of Conformity and Rebellion (2 q.h.)

Psychological factors in conforming or rebellious behavior. Specific attention to psychological motives and attitudes of the individual with respect to decisions on political participation, drugs, sexual behavior, educational policy, and other current social problems. *Prereq.* 19.503 or *equiv.*

19.528 Psychological Factors in National and International Conflict (2 q.h.)

A review of the psychological images, dynamics, and decisions in national and international loyalty and hostility. *Prereq.* 19.503 or *equiv.*

19.529 Interpersonal Behavior in the Small Group I (2 q.h.)

Participation and observation of personalities and role behaviors in small group interaction. Each student will observe and analyze the behavior of both himself and other group members. *Prereq. 19.503 or equiv.*

19.530 Interpersonal Behavior in the Small Group II (2 q.h.)

Continuation of 19.529. *Prereq. 19.529 or equiv.*

19.532 Industrial Psychology I (2 q.h.)

Psychology as applied to industry, including such topics as history causation of behavior, attitudes, morale, and supervision. *Prereq. 19.503 or equiv.*

19.533 Industrial Psychology II (2 q.h.)

The place of psychological tests in industry, individual differences, leadership, training, design of jobs and practical application of these topics for the student in industry. *Prereq. 19.532 or equiv.*

19.534 Industrial Psychology III (2 q.h.)

Topics studied this quarter include motivation, fatigue, safety, and job turnover as related to industry. Special emphasis given to industrial mental health, counseling, interviewing, and personnel selection. *Prereq. 19.533 or equiv.*

19.535 Psychological Factors in the Creative Process (2 q.h.)

Topics to be analyzed will include definitions of creativity, role of intelligence in creativity, motives for problem solving, creative personalities, the encouragement of creativity in the individual and groups, and computer duplication of creative behaviors. *Prereq. 19.503 or equiv.*

19.536 Psychology of Thought (2 q.h.)

Psychological factors in intuition, imagination, problem solving, information processing, and concept learning. *Prereq. 19.503 or equiv.*

19.537 Psychology of Language (2 q.h.)

The child's acquisition of language, verbal habits, the analysis and measurement of meaning, cultural determinants of linguistic behavior, communication processes, and recent research in psycholinguistics. *Prereq. 19.503 or equiv.*

19.538 Psychology of Learning I (2 q.h.)

The concept of learning will be examined critically on the basis of animal and human studies. Techniques for initiating and maintaining learned behavior will receive detailed attention.

19.539 Psychology of Learning II (2 q.h.)

Continuation of 19.538. *Prereq. 19.538 or equiv.*

19.541 Abnormal Psychology I (2 q.h.)

An introduction of the study of the etiology and dynamics of the abnormal personality. *Prereq. 19.503 or equiv.*

19.542 Abnormal Psychology II (2 q.h.)

The symptomatology and treatment of the neuroses and psychoses. *Prereq. 19.541 or equiv.*

19.543 Abnormal Psychology III (2 q.h.)

Psychosomatic, psychopathic, and organic disorders; varieties of psychotherapy.

Prereq. 19.542 or *equiv.*

19.544 Abnormal Psychology (Intensive) (6 q.h.)

Same as 19.541, 19.542 and 19.543. *Prereq.* 19.503 or *equiv.*

19.546 Psychological Testing I (2 q.h.)

Basic principles of test theory, test administration, and test construction.

Familiarization with representative types of tests. *Prereq.* 19.506 or *equiv.*

19.547 Psychological Testing II (2 q.h.)

Continuation of 19.546. *Prereq.* 19.546 or *equiv.*

19.551 Experimental Psychology I (2 cl., 2 lab., 3 q.h.)

The methods and techniques for the design, execution, and interpretation of psychological experiments. *Prereq.* 19.506 or *equiv.*

19.552 Experimental Psychology II (2 cl., 2 lab., 3 q.h.)

Laboratory instrumentation and research methodology in the investigation of sensory and perceptual processes. *Prereq.* 19.551 or *equiv.*

19.553 Experimental Psychology III (2 cl., 2 lab., 3 q.h.)

Laboratory instrumentation and research methodology in the investigation of animal and human learning, motivation, and thought. *Prereq.* 19.552 or *equiv.*

19.560 Psychology of Women (2 q.h.)

The examination, in both historical and contemporary context, the body of knowledge studying woman, her function in social roles and her behavior as determined genetically, physiologically and psychologically. The research implications, future life styles, roles, and contributions of women.

19.561 Historical Development of Psychology I (2 q.h.)

The historical development of psychology from its philosophical beginnings.

Prereq. two full-year courses in psychology.

19.562 Historical Development of Psychology II (2 q.h.)

Major schools of psychology which have influenced modern psychological research including functionalism, behaviorism, Gestalt psychology, and psychoanalysis. *Prereq.* 19.561 or *equiv.*

19.563 Historical Development of Psychology III (2 q.h.)

The role of theory in current psychological research. *Prereq.* 19.562 or *equiv.*

19.571 Seminar in Psychology (2 q.h.)

Discussion of current problems in psychology. *Prereq.* 19.553 or *equiv.*

19.591 Honors Program I (4 q.h.) *Prereq.* approval of the Dean.

19.592 Honors Program II (4 q.h.)

Prereq. 19.591.

19.593 Honors Program III (4 q.h.)

Prereq. 19.592.

20—ANTHROPOLOGY

Consultant: (See Sociology)

20.501 Anthropology I (2 q.h.) (formerly Introduction to Physical Anthropology). An introduction to elements of physical anthropology, covering such subjects as the primates, fossil man and evolution, problems of heredity and genetics, problems of race and racial classification, and the bases of cultural behavior.

20.502 Anthropology II (2 q.h.) (formerly Cultural Anthropology I) An introduction to cultural anthropology covering the nature of culture; methods and theories. *Prereq.* 20.501 or *equiv.*

20.503 Anthropology III (2 q.h.) (formerly Cultural Anthropology II) Characteristic features of the language, family life, rituals, and values of tribal peoples in different parts of the world. *Prereq.* 20.502 or *equiv.*

20.521 Culture and Personality (2 q.h.)
A cultural approach integrating concepts of social role, values, personality and socialization, and linguistic considerations. *Prereq.* 20.503 or *equiv.*

20.504 Anthropology (Intensive)
Same as 20.501, 502, plus 503.

20.531 Primitive Social Organization (2 q.h.)
The institutions of primitive societies; comparative approaches and functional explanations of a limited number of societies; the dynamics of continuity and change of culture and social organization. *Prereq.* 20.503 or *equiv.*

20.532 Primitive Religion (2 q.h.)
A study of religious beliefs and rituals of tribal peoples in many parts of the world, including the origin of religious behavior, the relationship of religious behavior to other aspects of culture, and the psychological factors involved. *Prereq.* 20.503 or *equiv.*

20.533 Acculturation (2 q.h.)
An examination of the processes of acculturation in culture contact situations of tribal and non-tribal peoples. Focus is on the role of the individual, and the concepts of personality and values in relation to this process. *Prereq.* 20.503 or *equiv.*

20.537 Anthropological Theory (2 q.h.)
A history of major orientations, emphasizing the principal contemporary orientations in the field. Evolutionary approaches, culture area and historical analysis, functionalism, role structure, comparative methods, social relations approaches, and the theory of cognitive structure. *Prereq.* 20.503 or *equiv.*

20.541 North American Indian (2 q.h.)
Prehistory of the North American Indian, including the study of aboriginal culture areas, utilizing a comparative analysis of representative Indian tribes and their cultures as the method of study. Family life, religion, warfare patterns, and political organization are described. *Prereq.* 20.503 or *equiv.*

20.544 African Peoples and Cultures (2 q.h.)

African geography, prehistory and cultures; the spectrum of cultures ranging from the Pygmy to Ashanti Federation; the family, lineage, clan and tribe as these relate to problems of political and economic change in contemporary Africa. *Prereq.* 20.503 or equiv.

20.547 Latin American Peoples and Cultures (2 q.h.)

Tribal social systems, traditional values, and institutions of Latin America with particular emphasis on Hispanic America. *Prereq.* 20.503 or equiv.

20.548 Studying the Family Cross Culturally (2 q.h.)

The course will focus on the formation of differing family systems according to a variety of cultural settings. These will include: the Todas, the Hopi, the Anglo-Saxon, the Kibbutz, and the Baganda.

20.549 Folklore (2 q.h.)

The general nature of folklore and methods employed in its study with emphasis on the behavioral-structural approach.

20.550 Peasant Society and Culture as an Anthropological Problem (2 q.h.)

How are peasant societies distinguished from tribes? In what sense do peasantries compose a general social type, and in what sense can we study peasantries comparatively? The development of the concept of peasantry from its European traditions through its modern uses. Analysis of representative case studies of traditional peasant societies in the non-Western and Western world, and some comparison of these findings to selected contiguous folk or tribal groups. *Prereq.* 20.503 or 20.602 or equiv.

20.551 The Comparative Study of Changing Peasantries (2 q.h.)

Modern studies of peasant societies from Asia, Europe, Africa, and Latin America will be analysed and compared from several points of view, including differing historical traditions, relations with the world outside, economic, political and social structure, change and modernization, and ideology. *Prereq.* 20.503 or 20.602 or equiv.

20.552 Eastern European Peasantry in the Modern World (2 q.h.)

An analysis and comparison of selected studies of peasant societies in East-Central and Southeastern Europe from Russia to Greece, encompassing varying forms from the traditional peasant village to collectivized peasant units. Consideration of similarities and differences in historical traditions and world outlook, as well as the impact of modern societies and programs of modernization, under varying forms of socialism and capitalism, upon the internal structure and processes of change within the peasant village. *Prereq.* 20.503 or 20.602 or equiv.

20.601 Principles of Anthropology I (4 q.h.)

An intensive introduction to elements of physical anthropology covering such subjects as the primates, fossil man and evolution problems of heredity and genetics, problems of race and racial classification, the bases of cultural behavior, and the nature of culture.

20.602 Principles of Anthropology II (4 q.h.)

An intensive introduction to cultural anthropology covering characteristic features of tribal peoples, language, family life, rituals, values, social organization, etc. *Prereq.* 20.601 or equiv.

20.699 Field Work in Anthropology (6 q.h.)

(Refer to page 82 describing field work courses.)

To be arranged with a departmental field work adviser prior to registration. *Prereq.* Major in Sociology-Anthropology and completion of 12 credits in Anthropology. (Students may receive credit for only one departmental field work course. Credit for 20.699 precludes credit for 21.699)

21—SOCIOLOGY

Consultant: Prof. Lila Leibowitz, Sociology Dept. (L.A. College)

Coordinator: Prof. M. Garrett, Sociology Dept. (L.A. College)

21.501 Sociology I (2 q.h.)

Basic concepts and theories relating to the study of man as a participant in group life with emphasis on social structure, culture, socialization, and the family.

21.502 Sociology II (2 q.h.)

A continuation of Sociology I with major emphasis on primary groups, associations, social stratification, collective behavior, and population. *Prereq.* 21.501 or equiv.

21.503 Sociology III (2 q.h.)

A continuation of Sociology II emphasizing a critical analysis of American society with particular attention to problems of social, political, urban, and industrial change. *Prereq.* 21.502 or equiv.

21.504 Sociology (Intensive) (6 q.h.)

Basic concepts and theories relating to the study of man as a participant in group life with emphasis on social structure, culture, socialization, and the family. Primary groups, associations, social stratification, collective behavior, and population. The major institutional areas, with particular attention to problems of social, political, urban, and industrial change. (Not open to students who have taken 21.501, 21.502, 21.503) *Prereq.* 30.506.

21.505 Drugs and Society (2 q.h.)

An introduction to the sociology of drugs. Examines social definitions of drugs, conditions of their use, and socialization into drug use. Considers deviant drug use and effects of social control on definitions and use. A range of licit and illicit drugs will be considered but major emphasis will be given to alcohol, marihuana, and heroin.

21.506 Sociology of Religion (2 q.h.)

An examination of the role of religious belief systems and institutions in various societies, ancient and modern, Western and non-Western.

21.507 Sex in Society: The Study of Sex Roles (2 q.h.)

Analysis of historical and contemporary development in how men and women's changing roles are related to the society at large.

21.508 Sociology of Literature (2 q.h.)

A novel approach to novels and other literary productions from lyrics and love songs to sci-fi and films. Sociological analysis of content and contexts.

21.509 Sociology of Socialist Societies (2 q.h.)

Comparative sociology of China, USSR, Cuba, others, focussing on ideology, social organization, economy, polity, education, child care, women's positions, etc. The course will emphasize processes of change and the interrelationships between institutions.

21.512 Social Research Methods I (2 q.h.)

An introduction to social research methods with particular attention to problems of theory and method in both anthropology and sociology. *Prereq.* Consent of the Instructor or 12 q.h. in sociology-anthropology.

21.513 Social Research Methods II (2 q.h.)

A continuation of Social Research Methods I with emphasis on data collection, measurement, and scaling in both anthropology and sociology. *Prereq.* 21.512 or equiv.

21.514 Social Research Methods III (2 q.h.)

A continuation of Social Research Methods II stressing the analysis of data. *Prereq.* 21.513 or equiv.

21.517 Social Theory I (formerly Foundations of Sociological Theory) (2 q.h.)

An historical survey of sociological theorists including the work of de Tocqueville, Comte, Marx, Durkheim, Cooley, and others. *Prereq.* Consent of the Instructor or 12 q.h. in sociology-anthropology.

21.518 Social Theory II (formerly Contemporary Sociological Theory I) (2 q.h.)

A study of major theoretical issues in sociology. Discussion concentrates on systematic questions and topics, as opposed to particular theorists, but material is drawn from theorists such as Weber, Simmel, Thomas, Mannheim, Merton, and Parsons. *Prereq.* 21.517 or equiv.

21.519 Social Theory III (formerly Contemporary Sociological Theory II) (2 q.h.)

A seminar in which the principal focus will be upon questions of theoretical interest, e.g., the problem of order, the problem of change, the role of the individual in change. Students will present their papers in class. *Prereq.* 21.518 or equiv.

21.528 Social Stratification: Class, Status, and Power (2 q.h.)

A comparative study of the nature of class structure with emphasis on the United States and with reference to India and England. Discussion of such topics as theories of class structure, factors determining class membership, differential class behavior, and social mobility. *Prereq.* 21.503 or equiv.

21.531 Social Change (2 q.h.)

An analysis of the changing patterns in social and economic institutions, a discussion of modern social trends, and a review of current literature in a field. *Prereq. 21.503 or equiv.*

21.534 Social Control (2 q.h.)

The study of group membership as a determinant of behavior, analysis of status and role, patterns of authority, and group ideology as factors in the evaluation of conduct. *Prereq. 21.503 or equiv.*

21.535 Political Sociology: Who Gets What (2 q.h.)

The social structure of political life emphasizing relationships in the structure of society with its classes, occupations, races, and levels of opportunity as they affect political activity. *Prereq. 21.503 or equiv.*

21.538 (see 25.538)

21.539 (see 25.539)

21.540 (see 25.540)

21.543 (see 25.543)

21.544 (see 25.544)

21.545 (see 25.545)

21.546 Sociology of Deviant Behavior (2 q.h.)

Analysis of the variety of social problems and their relationship to the organization of society. Particular attention will be given to alcoholism, sex offenses, drug abuse, mental health, and other problems relating to an urban industrial society. *Prereq. 21.503 or equiv.*

21.547 Social Problems (2 q.h.)

An overview of contemporary American social problems and the application of sociological concepts, methods, and principles to these problems. *Prereq. 21.503 or equiv.*

21.550 Juvenile Delinquency (2 q.h.)

A study of factors in delinquency and an examination of the implications for prevention, rehabilitation, and treatment. *Prereq. 21.503 or equiv.*

21.551 Family and Marriage I (2 q.h.)

A comparative and historical treatment stressing the past history and development of the family. *Prereq. 21.503 or equiv.*

21.552 Family and Marriage II (2 q.h.)

A continuation of Family and Marriage I emphasizing the backgrounds of contemporary problems in the context of functions, forms, and processes of this institution. *Prereq. 21.551 or equiv.*

21.553 Racial and Cultural Relations I (2 q.h.)

A study of the relationships between various racial, nationality, cultural, and religious groups with emphasis on the historical development of black-white relationships in American society. *Prereq. 21.503 or equiv.*

21.554 Racial and Cultural Relations II (2 q.h.)

A continuation of Racial and Cultural Relations I stressing the problems of contemporary black-white relationships in both American and other societies. *Prereq.* 21.553 or equiv.

21.555 Racial and Cultural Relations III (2 q.h.)

A continuation of Racial and Cultural Relations II with specific attention to religious nationality, and non-African racial groups in American and other multi-racial societies. *Prereq.* 21.554 or equiv.

21.556 Sociology of Poverty (2 q.h.)

An analysis of American poverty in historical perspective, drawing on comparisons with other countries. Critical evaluation of sociological research and theories relating to poverty. Consideration of causes and effects of poverty, as well as societal responses to poverty and its consequences. Suitable for students in applied fields, such as nursing, criminal justice, education, allied health, pre-med, and pre-law.

21.557 Urban Sociology (2 q.h.)

An analysis of the various causes, characteristics, and effects of urbanization in several different cultures of the world. Specific attention is given to the problems of urban and suburban living and the changing structure of the city. *Prereq.* 21.503 or equiv.

21.558 Community Analysis (2 q.h.)

Ecological theories of man's relation to his physical environment. Development of the concept, and discussion of community study methods. Contrasts between rural communities and urban neighborhoods. Discussion and evaluation of community action programs. *Prereq.* 21.503 or equiv.

21.559 Seminar in Urban Studies (2 q.h.)

Interdisciplinary approaches to analyses of urban issues, continuing student projects. *Prereq.* One previous course in urban studies field.

21.560 Medical Sociology (2 q.h.)

Sociological concepts and research relating to the study of patterns of behavior in the areas of health and disease. Emphasis on the family, community, medical organizations, class, and status as social subsystems related to the field of health. *Prereq.* 21.503 or equiv.

21.561 Sociology of Mental Health

The emphasis of this course will be the sociological aspects of mental health and mental disorder. There will be presentations and discussions of the social history of mental illness, epidemiological and cross-cultural approaches to mental disorder, the career of the mental patient, the functions of psychiatry in society, community and social treatment modalities and other aspects of social psychiatry. *Prereq.* 21.503 or 21.602 or equiv.

21.563 Social Gerontology: The Aged in Society (2 q.h.)

An examination of social factors involved in aging, with specific reference to how biological and psychological age change influence behavior, social roles, and cultural patterns. The relation of aging to social change, and special provisions for the aged. *Prereq.* 21.503 or equiv.

21.567 Population (2 q.h.)

The use of demographic methods in the analysis of social structures. Introduction to the use of population size and composition, birth rates, and other demographic data in the comparative analysis of societies. *Prereq.* 21.503 or equiv.

21.570 Sociology of Occupations and Professions (2 q.h.)

Analysis of the social relations within occupational groups, of occupational structure, and of institutional aspects of an occupation. Relationships of supervisors, peers, colleagues, subordinates, and clientele; their significance for work role behavior. *Prereq.* 21.503 or equiv.

21.573 Sociology of Industry (2 q.h.)

Comparison of pre-industrial and industrial society, stressing the impact of industry on society and the relationship between industry, culture, and values. Diversification and specialization. Human relations in industry; analysis of subordinate—super ordinate behavior, line and staff relationships, and formal and informal groups. *Prereq.* 21.503 or equiv.

21.575 Sociology of Formal Organizations: Humans, Machines, and Bureaucracy (2 q.h.)

A study of formal organizations and the principles that govern organizational life. Weber's theory of bureaucracy and the concept of authority; communication systems and other conceptions of formal organizations. The structure of work groups and their effect on the larger organization. *Prereq.* 21.503 or equiv.

21.591 Honors Program I (4 q.h.)

Prereq. approval of Dean.

21.592 Honors Program II (4 q.h.)

Prereq. 21.591.

21.593 Honors Program III (4 q.h.)

Prereq. 21.592.

21.601 Principles of Sociology I (Recommended for Majors) (4 q.h.)

An intensive introduction to basic concepts and theories relating to the study of man as a participant in group life. Emphasis is placed on socialization, culture, social structure, primary groups, family, social stratification, and population.

21.602 Principles of Sociology II (4 q.h.)

A continuation of Principles of Sociology I with emphasis on a critical analysis of American society with particular attention to problems of social, political, urban, and industrial change. *Prereq.* 21.601 or equiv.

21.612 Social Research Methods I (Intensive) (4 q.h.)

An intensive introduction to social research methods in both anthropology and sociology with particular attention to problems of theory, methods, and data collection. *Prereq.* Consent of the Instructor or 12 q.h. in sociology-anthropology.

21.613 Social Research Methods II (Intensive) (4 q.h.)

A continuation of Social Research Methods (Intensive) I, with emphasis on data collection, measurement, scaling, and the analysis of data. *Prereq.* 21.612.

21.617 Social Theory I (Intensive) (4 q.h.)

An historical survey of sociology theorists, including the work of de Tocqueville, Comte, Marx, Durkheim, Cooley, Weber, Simmel, and others. *Prereq.* *Consent of the Instructor or 12 q.h. in sociology-anthropology.*

21.618 Social Theory II (Intensive) (4 q.h.)

A study of major theoretical issues in sociology. Discussion concentrates on systematic questions and topics, but material is drawn from theorists such as Mannheim, Merton, Parsons. Students will present papers in class on questions of theoretical interest; e.g., the problem of order, the problem of change, the role of the individual in change, etc.

21.699 Field Work in Sociology (6 q.h.)

(Refer to page 82 describing field work courses.)

To be arranged with a departmental field work adviser prior to registration. *Prereq.* *Major in Sociology-Anthropology and completion of Social Research Methods 21.514 or 21.613.* (Students may receive credit for only one departmental field work course. Credit for 21.699 precludes credit for 20.699)

25—SOCIAL WELFARE

Course Coordinator: Prof. Lois Ames (College of Criminal Justice)

25.538 Introduction to Social Welfare I (2 q.h.) (formerly 21.538)

An introduction to the nature and scope of the social welfare institution, its historical development, the effects of urban industrialization, and its relationship to present day American Society.

25.539 Introduction to Social Welfare II (2 q.h.) (formerly 21.539)

A continuation of Introduction to Social Welfare I, with particular attention to the development of social security and the welfare state.

25.540 Introduction to Social Welfare III (2 q.h.) (formerly 21.540)

A continuation of Introduction to Social Welfare II, focusing on selected aspects of the current social welfare system, its attempts to alleviate poverty and other social problems.

25.543 Introduction to Social Work Practice I (2 q.h.) (formerly 21.543)

An introduction to the functions of the helping profession of social work, its settings and methods. Specific techniques such as interviewing, history taking, and recording skills are presented.

25.544 Introduction to Social Work Practice II (2 q.h.) (formerly 21.544)

A continuation of Introduction to Social Work Practice I, with particular attention to the functioning of social workers in selected settings.

25.545 Introduction to Social Work Practice III (2 q.h.) (formerly 21.545)

A continuation of Introduction to Social Work Practice II, with emphasis on enhancement of practice skills.

22—POLITICAL SCIENCE

Consultant: Prof. W. S. Jones, Chairman, Political Science Dept. (L.A. College)

Course Coordinator: Prof. Minton Goldman (L.A. College)

22.501 Principles of Political Science I (2 q.h.)

Evolution of the nation-state. Analysis of basic political concepts. Study of basic forms of the contemporary political system.

22.502 Principles of Political Science II (2 q.h.)

Analysis of constitutional and totalitarian models. Study of contemporary British and Soviet political systems. *Prereq.* 22.501 or equiv.

22.503 Principles of Political Science III (2 q.h.)

The American political system including study of civil rights. International politics and American foreign policy since 1945. *Prereq.* 22.502 or equiv.

22.505 Contemporary Political Theory (2 q.h.)

Political ideas and systems of political thought from Machiavelli to the present. *Prereq.* 22.504 or equiv.

22.506 American Political Thought (2 q.h.)

Political thought from the colonial period to the present including a study of the impact of religious, economic, and judicial theory on the structure of American ideas. *Prereq.* 22.503 or equiv.

22.507 Principles of Political Science (Intensive) (6 q.h.)

Evolution of the nation-state. Analysis of basic political concepts. Study of basic forms of the contemporary political system. Analysis of constitutional and totalitarian models. Study of contemporary British and Soviet political systems. The American political system including study of Civil Rights. International politics and American foreign policy since 1945. Not open to students who have taken 22.501, 22.502, 22.503, or equiv.

22.508 Research Methods (2 q.h.)

An introduction to some of the most common methods of carrying out research in the discipline of political science. Problems of theory construction, data-gathering, and a selection of analytical research tools including bibliographical aids and the computer are examined.

22.511 American National Government (2 q.h.)

A study of the form and structure of the federal constitution and an analysis of the legislative process at the national level. *Prereq.* 22.503 or equiv.

22.512 Urban and Metropolitan Government (2 q.h.)

The political, structural, and functional problems of an urbanizing United States, including an analysis of urban, suburban, and metropolitan governments. *Prereq.* 22.503 or equiv.

22.513 Political Parties and Pressure Groups (2 q.h.)

Party government in the United States and Great Britain. A contrasting study focusing on the interaction of party and government. *Prereq.* 22.503 or equiv.

22.514 American Constitutional Law (2 q.h.)

A case analysis of the development of federalism, the separation of powers, and the role of the federal and state courts in constitutional development.

22.515 Civil Rights (2 q.h.)

An evaluation of the quality and content of civil liberties in the United States. Emphasis will be placed on the first, fifth, sixth, fourteenth, and fifteenth amendments to The Constitution.

22.516 Public Administration I (2 q.h.)

An introduction to the theory, forms, and processes of administration at the national and state level.

22.517 Public Administration II (2 q.h.)

Selected problems. Case-study approach to examination of relation between the theory and practice of public administration. *Prereq.* 22.516 or *equiv.*

22.518 Government and Politics of the States (2 q.h.)

A study of state and local government and problems and the function and operational responses to them.

22.519 The Legislative Process (2 q.h.)

An institutional, functional analysis of the roles of Congress, the executive, and political parties in the legislative process.

22.521 Comparative Government I (2 q.h.)

A comparative analysis of political culture, organization, and behavior in England, France, and Germany. *Prereq.* 22.503 or *equiv.*

22.522 Comparative Government II (2 q.h.)

A continuation of 22.521. *Prereq.* 22.521 or *equiv.*

22.532 International Organization (2 q.h.)

Development of international organizations with special emphasis on the United Nations, specialized agencies, and regional organizations. *Prereq.* 22.503 or *equiv.*

22.533 American Foreign Policy (2 q.h.)

The constitution and political instruments for the formulation of American foreign policy. *Prereq.* 22.503 or *equiv.*

22.534 Soviet Foreign Policy (2 q.h.)

A study of the evolution of Soviet foreign policy since 1917 with emphasis on the development of the international Communist movement.

22.535 International Relations (4 q.h.)

Elements and limitations on national power. Contemporary world politics, problems of war and peaceful coexistence. *Prereq.* 22.503 or *equiv.* (Not to be taken by students who have credit for 22.531.)

22.536 Introduction to Political Theory (4 q.h.)

Development of the political ideas of the Western world. The major philosophers of Greece, Rome, The Christian Era, and the Renaissance. *Prereq.* 22.503 or *equiv.* (Not to be taken by students who have credit for 22.504.)

22.537 European Political Parties (2 q.h.)

A study of political party systems in England, France, and Germany emphasizing ideology, organization in and out of Parliament, electoral strategies, and voter behavior.

22.538 Communist China's Foreign Policy (2 q.h.)

A study of the Peking government's relations with Afro-Asia, the Soviet orbit, and the west. Attention is given to policy objectives, strategy, tactics, and the method of decision making in both the party and state apparatus.

22.541 International Law (2 q.h.)

A procedural and substantive study of legal relations among nation states.

22.542 American Foreign Policy I (2 q.h.)

Recent and current American foreign affairs. *Prereq.* 22.533 or equiv.

22.543 American Foreign Policy II (2 q.h.)

Recent and current American foreign affairs continued. *Prereq.* 22.542 or equiv.

22.544 Government and Politics in the Soviet Union I (2 q.h.)

An analysis of modern totalitarian theory and practice is followed by a study of the ideological and historical bases of the Soviet dictatorship. *Prereq.* 22.522 or equiv.

22.545 Government and Politics in the Soviet Union II (2 q.h.)

A continuation of 22.544. A study of the Soviet federalism, party and state organization, with special attention to the problems of political succession. *Prereq.* 22.544 or equiv.

22.547 Government and Politics of Communist China I (2 q.h.)

A study of Chinese political culture with emphasis on the nineteenth-century cultural, economic, and political impact of the West, the emergence of the Communist Party under the leadership of Mao, and the progressive disintegration of Kuomintang leadership. *Prereq.* 22.522 or equiv.

22.548 Government and Politics of Communist China II (2 q.h.)

A study of ideology, party, and state organization and behavior, and the Cultural Revolution. *Prereq.* 22.547 or equiv.

22.551 Current Political Issues (2 q.h.)

A topical analysis of the constitutional and political basis of selected problems in American political life.

22.552 Government and Politics in the Middle East I (2 q.h.)

A study of political change, economic growth, and social adaptation in selected countries of the Middle East. Foreign policies are also considered, especially the ties of the Middle Eastern countries with northern Africa. *Prereq.* 22.522 or equiv.

22.553 Government and Politics in the Middle East II (2 q.h.)

A continuation of 22.552. *Prereq.* 22.552 or equiv.

22.555 Government and Politics of Latin America I (2 q.h.)

After a discussion of the historical background of the Latin American nations, an analysis of the cultural, economic, social, and political characteristics of these countries is undertaken. Political violence and the breakdown of democratic governments is given particular attention. *Prereq.* 22.522 or *equiv.*

22.556 Government and Politics of Latin America II (2 q.h.)

This course analyzes politics of Mexico, Cuba, and Chile; the Communist, one-party, and democratic approaches to political development are compared, each of the three countries is used as an example. *Prereq.* 22.555 or *equiv.*

22.558 Government and Politics of South East Asia (2 q.h.)

A study of political instability and problems of establishing democratic structures and processes in the Philippines, Thailand, and India. *Prereq.* 22.522 or *equiv.*

22.559 Government and Politics of Japan (2 q.h.)

The historical development of the Japanese nation is studied with particular attention to the growth of fascism. Efforts to create a viable democracy since World War II is a major concern of the course. *Prereq.* 22.522 or *equiv.*

22.560 Politics and Policies of the Developing Nations I (2 q.h.)

Colonialism and the struggles for independence are discussed and the common problems of developing nations are analyzed. Topics include economic development, urbanization, cultural fragmentation, and revolution. *Prereq.* 22.522 or *equiv.*

22.561 Politics and Policies of the Developing Nations II (2 q.h.)

Based on the foundation provided in Part I, this course deals with efforts of developing countries to achieve rapid social, economic, and political modernization. The frequency of military takeovers and the prevalence of corrupt, inefficient government bureaucracies are discussed. The democratic and authoritarian avenues toward development are compared and evaluated. *Prereq.* 22.560 or *equiv.*

22.562 Government and Politics of Sub Saharan Africa (2 q.h.)

Comparative analysis of political culture, organization, and behavior of African states south of the Sahara. *Prereq.* 22.522 or *equiv.*

22.563 Government and Politics of Northern Africa (2 q.h.)

Comparative analysis of political culture, organization, and behavior of African states north of the Sahara. Emphasis is on Morocco, Algeria, Tunisia, and Egypt. *Prereq.* 22.522 or *equiv.*

22.564 Communism in Eastern Europe I (2 q.h.)

A study of the conditions and circumstances surrounding the establishment of Communist regimes in Eastern Europe immediately after the Second World War and their relations with the Soviet Union. *Prereq.* 22.522 or *equiv.*

22.565 Communism in Eastern Europe II (2 q.h.)

A continuation of 22.564. A study of nationalism, popular revolt, and socio-economic change in the 1950's and 1960's. Attention is given to the changing role of the Soviet Union in bloc affairs and the development of polycentrism. *Prereq.* 22.564 or *equiv.*

22.591 Honors Program I (4 q.h.)
Prereq. approval of the Dean.

22.592 Honors Program II (4 q.h.)
Prereq. 22.591.

22.593 Honors Program III (4 q.h.)
Prereq. 22.592.

22.601 Introduction to Political Science I (4 q.h.)
Basic political concepts and forces of organization from the classical Greeks to the modern nation-state. The Soviet Union and the United Kingdom are contrasted as contemporary illustrations of the institutional distinction between a totalitarian and a constitutional system. (*Not open to students who intend to receive credit for 22.501, 22.502, 22.503*)

22.602 Introduction to Political Science II (4 q.h.)
The development of operational liberty in the United States and its constitutional underpinnings are considered, together with an analysis of the national American political process and the conduct of recent American foreign relations. (*Not open to students who intend to receive credit for 22.501, 22.502, 22.503*)

23—HISTORY

Consultant: R. H. Robinson, Chairman, Department of History, College of Liberal Arts, 358 Richards Hall, Tel. 437-2660.

Coordinator of Western Civilization and Adviser to History Majors: G. H. Herman, Department of History, College of Liberal Arts, 375 Richards Hall, Tel. 437-2660.

23.500 The Historian's Craft (4 q.h.)
The ways in which the historian studies the past with emphasis on research and writing.

23.501 Western Civilization I (2 q.h.)
The beginnings of Western Civilization with emphasis on the political, economic, and social history of ancient and medieval times to 1300.

23.502 Western Civilization II (2 q.h.)
Early Modern Europe from 1300 to 1789 with an examination of the two major intellectual movements, the Renaissance and the Enlightenment, and their impact on the rise of national states, capitalism, and Protestantism.

23.503 Western Civilization III (2 q.h.)
Modern Europe from 1789 to the present emphasizing the rise of ideology in a technological age.

23.504 American History I (2 q.h.)
America from 1763 to 1840 with emphasis on political institutions and policies of the new republic.

23.505 American History II (2 q.h.)

The United States from 1840 to 1900 with emphasis on the rise of the sectional controversy, the Civil War, and the economic development of the nation after the war.

23.506 American History III (2 q.h.)

The United States since 1900, an age of urbanized industrialism and international crisis.

23.509 Western Civilization A* (3 q.h.)

Western Civilization to 1648. *Not open to students who intend to receive credit for 23.501 and/or 23.502.*

23.510 Western Civilization B* (3 q.h.)

Western Civilization since 1648. *Not open to students who intend to receive credit for 23.502 and/or 23.503.*

23.511 American History A* (3 q.h.)

America from 1763 to 1877. *Not open to students who intend to receive credit for 23.504 and/or 23.505.*

23.512 American History B* (3 q.h.)

The United States since 1877. *Not open to students who intend to receive credit for 23.505 and/or 23.506.*

23.515 Women in American History (2 q.h., Group III)

An historical examination of the position and role of women in American history.

23.516 Women in European History (2 q.h., Group II)

An historical examination of the position and role of women in European history.

23.520 Population in History (2 q.h., Group I or II)

An application of the principles of demography to European history from Roman times to the present.

23.521 Ancient Middle East (2 q.h., Group I)

A study of ancient cultures and people in the Middle East to the rise of Islam.

23.522 Ancient Greece (2 q.h., Group I)

The origin and development of Greek civilization.

23.523 Ancient Rome (2 q.h., Group I)

Roman civilization in ancient times with emphasis on the rise of the Republic and the decline of the Empire.

23.524 Early Middle Ages (2 q.h., Group I)

Europe from the decline of the Roman Empire to 1050 with emphasis on barbarian migrations, the role of religion in medieval society, and the fashioning of political and economic institutions of feudalism and manorialism.

*The course sequence 23.509, 23.510 is identical to 23.501, 23.502 and 23.503.

The course sequence 23.511, 23.512 is identical to 23.504, 23.505 and 23.506.

The A and B sequence is accomplished in two quarters rather than three for the I, II, III sequence.

23.525 Late Middle Ages (2 q.h., Group I)

The medieval period from 1050 to 1350 with emphasis on the church-state controversy and the growth of classicism in the arts.

23.526 Early Modern Europe (2 q.h., Group I)

The political, economic, and social history of Europe from 1350 to 1648.

23.527 England, 500–1603 (2 q.h., Group I)

England to the coming of the Stuarts.

23.530 Byzantine History (2 q.h., Group I)

A political and cultural history of the Eastern Christian world from the fourth century to the sacking of Constantinople in 1453.

23.531 Islamic History (2 q.h., Group IV)

The history of the Muslim Arab world from the seventh century to the end of the Abbasid Caliphate in 1258.

23.532 Ottoman History (2 q.h., Group IV)

A study of the rise, glory, decay, and attempts at reform in the Ottoman Empire from the thirteenth century to World War I.

23.533 History of the Jews I (2 q.h., Group I)

A survey of the Jews from the end of antiquity to early modern times from a cultural and intellectual perspective.

23.534 History of the Jews II (2 q.h., Group II)

The role and position of the Jew in modern history.

23.537 European Intellectual History, 1350–1688 (2 q.h., Group I)

The major ideas of the Renaissance and Reformation.

23.538 European Intellectual History, 1688–1815 (2 q.h., Group I)

The broad spectrum of eighteenth-century thought with emphasis on scientific, religious, and political ideas.

23.539 European Intellectual History since 1815 (2 q.h., Group II)

The main currents of European thought considered in their social and political context from Romanticism to the present.

23.541 Europe, 1648–1789 (2 q.h., Group I)

Europe from the end of the Thirty Years' War to the French Revolution.

23.542 Europe, 1789–1870 (2 q.h., Group II)

Europe from the French Revolution to the Franco-Prussian War with a stress on the struggles for liberalism and nationalism.

23.543 Europe, 1870–1914 (2 q.h., Group II)

The background of World War I with an emphasis on the roles of nationalism, militarism, imperialism, and the European alliance system.

23.544 Europe, 1914–1939 (2 q.h., Group II)

Europe from World War I to World War II, emphasizing the failures of peace-makers at Versailles and the subsequent rise of aggressive autocracies in Italy and Germany.

23.545 Europe since 1939 (2 q.h., Group II)

World War II and its aftermath with an emphasis on the Cold War and attempts by European nations to unify the continent.

23.548 England, 1603–1815 (2 q.h., Group I)

England in the Stuart and Hanover age with emphasis on the victory of the parliamentary institutions over the monarchy.

23.549 England since 1815 (2 q.h., Group II)

The democratization of English life in the nineteenth and twentieth centuries with emphasis on changing imperial and international relations.

23.552 English Constitutional History to 1485 (2 q.h., Group I)

The development of the English constitution from Anglo-Saxon roots to the coming of the Tudors, with attention to local as well as central government.

23.553 English Constitutional History since 1485 (2 q.h., Group II)

The victory of Parliament over the King and the subsequent democratization of England's governmental institutions and processes.

23.554 France since 1815 (2 q.h., Group II)

France after Napoleon with attention to continuing attempts by the French people to find satisfactory political institutions.

23.555 Germany since 1815 (2 q.h., Group II)

An analysis of the role of nationalism in German life after 1815 with emphasis on unification, militarism, and imperialism.

23.556 Italy since 1815 (2 q.h., Group II)

The unification of Italy, the attempt to establish constitutional monarchy, the rise of fascism after World War I, and the movement toward democratic republicanism after World War II.

23.557 Ireland since 1800 (2 q.h., Group II)

A study of the Irish question in British politics from the Act of Union to the establishment of the Free State.

23.558 European Economy and Society to 1750 (4 q.h., Group I)

A topical survey of European economic and social development in the pre-industrial period.

23.559 European Economy and Society since 1750 (4 q.h., Group II)

A topical survey of European economic and social development from the beginnings of industrialization to the present.

23.560 American Indians (2 q.h., Group III)

A survey of the American Indian from pre-Columbian times to the present.

23.561 Colonial America to 1689 (2 q.h., Group III)

The exploration and settlement of North America with emphasis on the establishment of political, social, and economic institutions.

23.562 Colonial America, 1689–1763 (2 q.h., Group III)

North America in an age of international rivalry for the continent.

- 23.563 American Revolution and Constitution** (2 q.h., Group III)
America's quest for independence from England and the efforts to establish governments in the new republic.
- 23.564 American Constitutional History, 1789–1900** (2 q.h., Group III)
Selected topics in the development of the American Constitution with primary emphasis on federalism and the relations of government and the economy.
- 23.565 American Constitutional History since 1900** (2 q.h., Group III)
Topics include the conflict between the liberal and conservative attitudes toward the role of government in the economy and the role of the Supreme Court in the struggle for civil liberties and rights.
- 23.566 United States since 1945** (4 q.h., Group III)
The American people from the close of World War II to the present.
- 23.567 American Diplomatic History** (2 q.h., Group III)
Selected topics in the history of American foreign relations and policy since 1789.
- 23.568 American Social History** (2 q.h., Group III)
Selected topics in the life of the American people since 1789.
- 23.569 American Economic History** (2 q.h., Group III)
Selected topics in the development of the capitalist economy in America since 1789 with attention to the role of government.
- 23.571 American Urban History** (2 q.h., Group III)
The development of urban society in the United States since 1800.
- 23.574 Afro-American History** (2 q.h., Group III)
The history of Afro-Americans from colonial times to the present.
- 23.575 Populism and Progressivism** (2 q.h., Group III)
A topical history of the United States from 1877 to 1917 concentrating on its social and cultural reactions to the processes of industrialization and urbanization.
- 23.576 The United States, 1917–1933** (2 q.h., Group III)
A topical history of the United States in time of world war, prosperity, and depression.
- 23.577 The Age of Roosevelt** (2 q.h., Group III)
America in the era of the Great Depression and World War II.
- 23.580 Perceptions of America** (2 q.h., Group III)
A study of the image of America and Americans as expressed by Americans and others.
- 23.581 Latin America to 1826** (2 q.h., Group IV)
The fusing of Indian, Iberian, and Negro cultures in Latin America and the quest for political independence.

23.582 Latin America, 1826–1920 (2 q.h., Group IV)

The attempts by Latin Americans to establish stable societies and democratic governments.

23.583 Contemporary Latin America (2 q.h., Group IV)

The struggles of Latin Americans for political, economic, and social development since 1920.

23.584 The Far East to 1850 (2 q.h., Group IV)

The history of China and Japan prior to their opening by the West in the mid-nineteenth century.

23.585 China since 1850 (2 q.h., Group IV)

A century of China's history with emphasis on the western impact on Chinese civilization, China's struggle to maintain independence, and the victory of communism in the twentieth century.

23.586 Japan since 1850 (2 q.h., Group IV)

An analysis of Japanese domestic developments and foreign relations since the mid-nineteenth century.

23.588 Africa to 1885 (2 q.h., Group IV)

African prehistory; the evolution of African government and society; the dynamics of Afro-European contact before 1885.

23.589 Africa since 1885 (2 q.h., Group IV)

The European impact on Africa; the rise of African nationalism; the emergence of independent African states.

23.591 Modern Middle East (2 q.h., Group IV)

The Middle East since 1914 with attention to Zionism, Pan Arabism, the effects of two world wars, and the postwar settlements.

23.592 India and Pakistan (2 q.h., Group IV)

The political and religious history of the peoples who formed India and Pakistan with an account of internal developments and foreign relations since independence.

23.593 Southeast Asia (4 q.h., Group IV)

The cultures of the peoples of Southeast Asia with an examination of the impact of European nations upon them and an account of their quests for national identity and economic development.

23.594 Russia, 1450–1801 (2 q.h., Group I)

The emergence of Russia as a recognized European power with an account of westernization and expansion in the eighteenth century.

23.595 Russia, 1801–1917 (2 q.h., Group II)

The history of the Russian people and their government from the days of Czar Alexander I to the revolutions of 1917.

23.596 Russia since 1917 (2 q.h., Group II)

The revolutions of 1917 and the subsequent history of the Russian people and their government with special emphasis on foreign relations.

23.597 Honors Program I (4 q.h.)

Prereq. approval of Dean.

23.598 Honors Program II (4 q.h.)

Prereq. 23.597.

23.599 Honors Program III (4 q.h.)

Prereq. 23.598.

23.601 Western Civilization IV (4 q.h.)

The major ideas and institutions of Western Civilization from ancient times to 1648. (*Not open to students who intend to receive credit for 23.501, 23.502, or 23.509*)

23.602 Western Civilization V (4 q.h.)

A continuation of 23.601, covering the period since 1648. (*Not open to students who intend to receive credit for 23.502, 23.503, or 23.510*)

23.699 Field Work in History (6 q.h.)

Extra-collegiate experience in historical research or historical agencies. (Refer to page 82 describing field work courses) *Prereq. Survey courses in Western Civilization and American History and 23.500.*

25—SOCIAL WELFARE (see page 181.)

26—PHILOSOPHY

Consultant: Prof. W. L. Fogg, Chairman, Philosophy Dept. (L.A. College)

26.501 Introduction to Philosophy I (2 q.h.)

An examination of the aims, functions, and methods of philosophy by means of a systematic study of one or two philosophers. Questions in ethics and moral philosophy stressed in the latter part of the quarter.

26.502 Introduction to Philosophy II (2 q.h.)

Development of some of the major conceptions of the meaning of human existence, the nature of human knowledge, and the nature and existence of God.

26.503 Introduction to Philosophy III (2 q.h.)

A study of some of the central views of the aims, structure, and functions of society. One other area in philosophy will be discussed in the latter half of this quarter.

26.510 Introduction to Philosophy (Intensive) (6 q.h.)

An examination of the aims, functions, and methods of philosophy in comparison with other areas of human knowledge and valuation. Inquiry into the nature of morality, kinds of moral judgments, and types of ethical theories with particular attention to their application to moral issues of our day. Comparison of major conceptions of the ultimate meaning of human existence, the nature of mind, freedom, and God. *Not open to students who have taken 26.501, 26.502, 26.503, or equiv.*

26.504 The Greek and Roman Philosophers (2 q.h.)

Development of western thought from the seventh century B.C. until the time of Christ with emphasis upon Plato, Aristotle, and the Stoics.

26.505 The Ages of Belief and Adventure (2 q.h.)

The leading philosophers of the early Christian, Medieval, and Renaissance periods with particular attention to St. Augustine, St. Thomas, Francis Bacon, and Thomas Hobbes. *Prereq.* 26.504 or *equiv.*

26.506 The Ages of Reason and Enlightenment (2 q.h.)

Philosophy in the seventeenth and eighteenth centuries with emphasis upon Descartes, Spinoza, Locke, Hume, and Kant. *Prereq.* 26.505 or *equiv.*

26.507 Philosophy of the Nineteenth Century (2 q.h.)

Philosophic trends in the nineteenth century considered as background for the understanding of ideas influential in the twentieth century. *Prereq.* 26.503, 26.506 or *equiv.*

26.508 Twentieth-Century Philosophy (2 q.h.)

Discussion of the major contemporary philosophic trends as represented by logical positivism, analytic philosophy, and existentialism. *Prereq.* 26.507 or *equiv.*

26.509 Major Thinkers of our Time (2 q.h.)

An in-depth study of two or three philosophers, representatives of which would be Austin, Ayer, Carnap, Dewey, Lewis, Maritain, Moore, Sartre, or Whitehead. *Prereq.* 26.508 or *equiv.*

26.511 Philosophy of Art I (2 q.h.)

The nature of art and the experience of beauty.

26.512 Philosophy of Art II (2 q.h.)

Theories concerning art and aesthetic experience such as those of Plato, Aristotle, Tolstoy, Santayana, Dewey, and Cassirer. *Prereq.* 26.511 or *equiv.*

26.513 Philosophy of Art III (2 q.h.)

A study of the problems of artistic taste, standards of criticism, and the objectivity of artistic judgments. Concludes with a discussion of the arts, the artist, and society. *Prereq.* 26.512 or *equiv.*

26.514 The Human Search for Meaning (2 q.h.)

The role of selected recent philosophy and literature in the human struggle for meaning and identity. Some of the themes to be explored: freedom and responsibility; alienation and anxiety; death and finitude.

26.515 Images of Man in Philosophy (2 q.h.)

An exploration of selected concepts of the nature of man in philosophy and literature.

26.516 Technology and Man (2 q.h.)

An exploration of the human issues which have arisen in a technological age. Issues such as the relations between man and machine and the moral issues surrounding organ transplants are representative.

26.517 Utopias and Anti-Utopias (2 q.h.)

A study of utopian and anti-utopian literature as expressions of social criticism and as theories of social reform.

26.521 Philosophy of Religion I (2 q.h.)

A study of the nature of religious experience and beliefs about the nature of God.

26.522 Philosophy of Religion II (2 q.h.)

The origins, nature, and functions of religion. *Prereq.* 26.521 or equiv.

26.523 Philosophy of Religion III (2 q.h.)

Intensive study of some of the major problems such as natural and moral evil, the soul, immortality, miracles, and religious knowledge. *Prereq.* 26.522 or equiv.

26.524 The Great Eastern Religions I (2 q.h.)

The development of eastern primitive religions and their subsequent evolution into the sophisticated forms of the contemporary eastern religions.

26.525 The Great Eastern Religions II (2 q.h.)

Study of Egyptian and Babylonian religions, Confucianism, and Taoism. *Prereq.* 26.524 or equiv.

26.526 The Great Eastern Religions III (2 q.h.)

Study of Hinduism, Buddhism, and Shintoism. *Prereq.* 26.525 or equiv.

26.527 The Great Western Religions I (2 q.h.)

The development of western primitive religions and their subsequent evolution into the sophisticated forms of the contemporary western religions.

26.528 The Great Western Religions II (2 q.h.)

Study of Zoroastrianism, Judaism, and Christianity. *Prereq.* 26.527 or equiv.

26.529 The Great Western Religions III (2 q.h.)

Study of the religion of Islam, contemporary religious sects, and religious phenomena. *Prereq.* 26.528 or equiv.

26.531 Ethics I (2 q.h.)

Introduction to moral problems such as egoism and altruism, good and evil, conscience, obligation, and human freedom.

26.532 Ethics II (2 q.h.)

Critical discussion of some of the major ethical theories and the implications of modern psychological and sociological theories about man and society. *Prereq.* 26.531 or equiv.

26.533 Ethics III (2 q.h.)

The relations of ethical theory and morality to religion, social philosophy, art, and science. *Prereq.* 26.532 or equiv.

26.534 Logic (2 q.h.)

Emphasis upon logic as a practical discipline which enables the student to analyze types of arguments and to detect fallacies in arguments.

26.535 Ethics (intensive) (6 q.h.)

Same as 26.532, 533, and 534.

26.541 Social Philosophy I (2 q.h.)

Critical examination of the leading socio-political ideologies in regard to their conceptions of the character, structure and function of society. Plato and Aristotle emphasized.

26.542 Social Philosophy II (2 q.h.)

Continuation of 26.541 with emphasis upon Hobbes, Locke, Hegel, and Mill. *Prereq.* 26.541 or *equiv.*

26.543 Social Philosophy III (2 q.h.)

Emphasis upon Marxism, contemporary communism, fascism, capitalism, and contemporary social ideologies. *Prereq.* 26.542 or *equiv.*

26.544 Selected Topics in Philosophy I (2 q.h.)

Advanced course. Readings chosen jointly by students and instructor. Has included such topics as aggression, utopian literature, Marxism, pragmatism.

26.545 Selected Topics in Philosophy II (2 q.h.)

Continuation of 26.544

26.546 Selected Topics in Philosophy III (2 q.h.)

Continuation of 26.545

26.551 The Existentialist Revolt (2 q.h.)

Sources of existentialism in the Western tradition with emphasis upon Kierkegaard and Nietzsche.

26.552 The Existentialist Challenge (2 q.h.)

The existential view of man and his world with emphasis upon Heidegger, Sartre, and the religious existentialists—Marcel, Tillich, and Buber. *Prereq.* 26.551 or *equiv.*

26.553 Existentialism Appraised (2 q.h.)

Contemporary assessments of the existentialism movement, its meaning, significance, and truth. *Prereq.* 26.552 or *equiv.*

26.560 Buddhism (2 q.h.)

The principal teachings of the Buddhists.

26.561 Hinduism (2 q.h.)

The major Hindu teachings.

26.562 Islam (2 q.h.)

The major principles of Islam.

26.563 Judaism (2 q.h.)

The elements of Judaism.

26.567 Mysticism: East & West (2 q.h.)

An exploration of mystical experiences through a discussion of some representative religious mystics.

26.570 Religion & Myth (2 q.h.)

A study of myths as the expressions of religious man's experience of the world and himself. Examples will be drawn from primitive religions and the traditional religions of East and West.

27—FINE ARTS

Consultant: Prof. R. L. Wells, Chairman, Art Dept. (L.A. College)

27.501 Introduction to the Arts (2 q.h.)

Introduction to the techniques and meanings of various artistic expressions in painting, sculpture, drawing, architecture, and graphic arts.

27.504 History of Art I (2 q.h.)

History of Western art from prehistoric times to the end of the Roman Empire.

27.505 History of Art II (2 q.h.)

History of Western art from the end of the Roman Empire to the late sixteenth century. *Prereq.* 27.504.

27.506 History of Art III (2 q.h.)

History of Western Art from the late sixteenth century to the twentieth century. *Prereq.* 27.505.

27.507 Ancient Architecture (2 q.h.)

Developments in the builder's art from prehistoric times to the end of the Classical Era.

27.508 Medieval and Renaissance Architecture (2 q.h.)

A study of architecture from the Early Christian Period through the Renaissance.

27.509 European Architecture (2 q.h.)

Seventeenth- eighteenth- and nineteenth-century architecture.

27.510 Ancient Painting and Sculpture I (2 q.h.)

A survey of art from pre-historic period through Egypt and Mesopotamia.

27.511 Ancient Painting and Sculpture II (2 q.h.)

A survey of art from Crete through Greece and Rome.

27.512 Medieval Painting and Sculpture (2 q.h.)

Early Christian era; Byzantine, Romanesque, and Gothic art.

27.514 European Painting (2 q.h.)

Development of painting from the late sixteenth century to the middle of the nineteenth century in Northern and Western Europe.

27.515 Modern Painting I (2 q.h.)

The development of painting from late nineteenth century to the Surrealist movement.

27.516 Modern Painting II (2 q.h.)

The various styles of painting from Surrealism to contemporary art.

27.518 Twentieth-Century American Architecture (2 q.h.)

Study of architecture from Richardson to the present.

27.519 Twentieth-Century European Architecture (2 q.h.)

Study of architecture from Le Corbusier to the present.

27.520 Italian Renaissance Art (2 q.h.)

Study of painting and sculpture of the fifteenth and sixteenth centuries.

27.522 French Painting (2 q.h.)

Study of French painting of the nineteenth century.

27.523 English Art (2 q.h.)

English art from the Gothic to the nineteenth century.

27.524 American Art I (2 q.h.)

The development of American architecture, sculpture, and painting from Colonial times to the War of Independence.

27.525 American Art II (2 q.h.)

The development of American architecture, sculpture and painting from the Revolution to the Civil War. *Prereq.* 27.524 or equiv.

27.526 American Art III (2 q.h.)

The development of American architecture, sculpture and painting from the Civil War to the present. *Prereq.* 27.525 or equiv.

27.527 Life Drawing I (3 q.h.)

Basic life drawing involving anatomy and study of figure drawing. *Prereq.* 27.543 or other drawing courses on departmental approval.

27.528 Life Drawing II (3 q.h.)

Life drawing of the figure in various media. *Prereq.* 27.527.

27.529 Life Drawing III (3 q.h.)

Figure drawing and figure composition in various media. *Prereq.* 27.528.

27.535 African Art (2 q.h.)

Various stylistic characteristics of sculpture and other artistic expressions of the major cultures of Africa from the thirteenth to the twentieth century.

27.536 Latin American Art (2 q.h.)

Pre-Columbian and post-Columbian art forms of Latin America, including architecture, sculpture, painting, and the decorative arts—excluding Mexico.

27.538 Chinese Painting (2 q.h.)

A history of the Chinese art of painting from its inception to the twentieth century.

27.539 Japanese Art (2 q.h.)

The arts of painting, sculpture, and architecture in Japan.

27.540 Free-hand Drawing (3 q.h.)

An elementary course in drawing. (Does not fulfill the drawing requirement for the studio art major.)

27.541 Drawing I (3 q.h.)

Practice in the techniques and development of drawing in pencil, pen, and ink, with concentration on basic drawing problems.

27.542 Drawing II (3 q.h.)

Practice in the techniques of wash drawing, scratch board drawing, and mixed medias. *Prereq.* 27.541 or *equiv.*

27.543 Drawing III (3 q.h.)

Study of human anatomy and the practice of figure drawing and composition. *Prereq.* 27.542 or *equiv.*

27.544 Graphic Arts I (3 q.h.)

Creative expression in various graphic art media such as woodcuts.

27.545 Graphic Arts II (3 q.h.)

Execution of prints in various media and the printing process.

27.546 Graphic Arts III (3 q.h.)

Execution of more advanced print making with various graphic media.

27.547 European Graphic Arts (2 q.h.)

History of graphic arts from the Medieval period to the end of the nineteenth century. Development of engraving, etching, woodcuts, and lithography.

27.551 Painting—Basic Level I (3 q.h.)

Practice and creative expression in the technical fundamentals of figure and landscape painting.

27.552 Painting—Basic Level II (3 q.h.)

Creative expression in advance painting problems of figure study. *Prereq.* 27.551 or *equiv.*

27.553 Painting—Basic Level III (3 q.h.)

Creative expression in advanced painting problems in composition. *Prereq.* 27.552 or *equiv.*

27.554 Painting—Advanced Level I (3 q.h.)

Painting with concentration upon the development of personal expression and style.

27.555 Painting—Advanced Level II (3 q.h.)

Painting with concentration upon the development of personal style and the execution of various painting problems.

27.556 Painting—Advanced Level III (3 q.h.)

Development of style and experimentation with various media.

27.557 Advanced Graphic Arts I (3 q.h.)

Execution of advanced printmaking in various media. *Prereq.* 27.544, 546, 547 or other graphic courses on departmental approval.

27.558 Advanced Graphic Arts II (3 q.h.)

Printmaking in various experimental media. *Prereq.* 27.557.

27.559 Advanced Graphic Arts III (3 q.h.)

Printmaking in various media. *Prereq.* 27.558.

27.560 Oriental Indian Art (2 q.h.)

The national Indian styles of sculpture, painting, and architecture

27.561 Basic Color and Design I (3 q.h.)

Study and practice of the principles of design and science of color.

27.562 Basic Color and Design II (3 q.h.)

Advanced study in the science of color. *Prereq.* 27.561 or equiv.

27.563 Basic Color and Design III (3 q.h.)

Advanced problems in design. *Prereq.* 27.562 or equiv.

27.564 Advanced Color and Design (3 q.h.)

Creative expression in various color and design problems.

27.571 Basic Commercial Design I (3 q.h.)

Study and creative work in layout, illustration, advertising, and typography.

27.572 Basic Commercial Design II (3 q.h.)

Advanced commercial design problems. *Prereq.* 27.571 or equiv.

27.573 Basic Commercial Design III (3 q.h.)

Advanced commercial design problems. *Prereq.* 27.572 or equiv.

27.574 Advanced Commercial Design (3 q.h.)

Creative problems in illustration design.

27.587 History of Photography I (2 q.h.)

Early developments in photography from ancient times to the daguerreotype.

27.588 History of Photography II (2 q.h.)

Developments of modern photography from the work of Stieglitz to the present.
Prereq. 27.587 or equiv.

27.589 History of Photography III (2 q.h.)

Study of styles in contemporary photography with emphasis on major modern photographs. *Prereq.* 27.588 or equiv.

27.591 Art Seminar (2 q.h.)

Specific techniques, problems, and theories in art. Students will be responsible for research projects and papers.

27.592 New York Art Seminar (2 q.h.)

Study and inspection of the painting collections in the Metropolitan Museum of Art, Frick Collection, Museum of Modern Art, and the Guggenheim Museum.

27.594 European Art Seminar (2 q.h.)

A four-week study and travel seminar through major European art centers, with emphasis on the major works of art in each.

27.597 History and Technique of Film Art I (2 q.h.)

A study of the development of film art in Europe and America from its origins to 1945.

27.598 History and Technique of Film Art II (2 q.h.)

A study of the development of film art in the United States and Europe from 1945 to the present. *Prereq.* 27.597.

27.599 History and Techniques of Film Art III (2 q.h.)

Study of films by major contemporary directors. *Prereq.* 27.598.

27.600 Honors Program I (4 q.h.) *Prereq.* approval of the Dean.

27.601 Honors Program II (4 q.h.) *Prereq.* 27.600.

27.602 Honors Program III (4 q.h.) *Prereq.* 27.601.

27.603 Mexican Art (2 q.h.)

Pre-Columbian art from the Archaic and Classical periods to the present.

28—MUSIC

Consultant: Prof. R. L. Nadeau, Chairman, Music Dept. (L.A. College)

28.501 Introduction to Music (2 q.h.)

The principal concern is to teach the student a technique for listening actively to music. The course surveys and analyzes works by J. S. Bach, Mozart, Beethoven, Wagner, Stravinsky, and others.

28.503 Women in Music (2 q.h.)

A study in depth of the historical role of women in music; woman as composer, performer, patron, inspiration.

28.507 Fundamentals of Music I (for non-majors) (2 q.h.)

A course for beginners who are not music majors. The development of music reading and hearing skills. Simple notation of pitch and rhythm. Scales, intervals, chords.

28.508 Fundamentals of Music II (2 q.h.)

Continuation of course 28.507. New students admitted upon examination. Dictation, part-singing, and sight-singing. Beginning instrumental studies in recorder. *Prereq.* 28.507 or equiv.

28.509 Fundamentals of Music III (2 q.h.)

Continuation of course 28.508. New students admitted upon examination. Major, minor, and modal melodies. Seventh-chord symbols. Voice leading, cadences. Chorale analysis. Continuation of instrumental studies on recorder. *Prereq.* 28.508 or equiv.

28.510 Music and Art (2 q.h.)

A chronological survey of the relationship between music and art comparing the musical styles of great composers and the pictorial qualities of the master painters of our heritage.

28.511 History of Music (2 q.h.)

A survey of the historical trends in music from ancient times to the present. Men, ideas, and events which have influenced change in musical style will be highlighted. From this course, the student should gain a broad overview of musical literature and history which will enhance his understanding and future concert-going.

28.515 Contemporary Music (2 q.h.)

Contemporary music and its techniques seen as a mirror of our time. Major composers studied include Stravinsky, Debussy, Ravel, Bartok, Prokofiev, Hindemith, Milhaud, and Schoenberg.

28.517 Music as a Means of Social Expression (2 q.h.) (formerly Music as the Expression of Man)

A general and philosophical view of music in Western culture covering the following: aspects of social relevance; compositional style in various periods; and important themes, (war and peace, love and rejection, etc.) examined in a musical context. When pertinent, related concepts from the fine arts and from philosophy will be explored. Live performance, recordings, and audio-visual media will be used.

28.520 Musical Forms (2 q.h.)

The fugue, the sonata, theme and variations, rondo, the lied; analysis of the symphony, the string quartet, the opera, and the tone poem.

28.521 The Symphony (2 q.h.)

A thorough study of the symphonies of Haydn, Mozart, Beethoven, Berlioz, Brahms, Dvorak, and Tchaikovsky.

28.522 The Concerto (2 q.h.)

The evolution of the concerto from its origins in the Baroque period to its use in our time. Concertos for every instrument are studied, including piano, cello, violin, horn, organ, and bassoon.

28.523 Great Literature for the Piano (2 q.h.)

The study of pianoforte music written in the nineteenth and early twentieth centuries by masters such as Beethoven, Chopin, Schumann, Liszt, Debussy, and Ravel.

28.524 The World of Opera (2 q.h.)

Distinctions will be made between music drama and the number opera. Students will be required to acquire librettos. Aria, recitative, ensemble, and other basic elements of opera will be isolated and discussed.

28.526 Jazz: Evolution and Essence (2 q.h.)

The many roots of jazz and its development from the work song and the vocal blues to the avant-garde experiments of today. Contributions of the major performers: soloists, arrangers, composers. The problems of "on-the-spot" creativity and personal expression. The "beat." Multiplicity of accent.

28.528 Ear Training I (2 q.h.)

Rhythmic articulation. Solmization studies in major keys; G and F Clef. Conductor's beat patterns in simple meter. Rhythmic and melodic dictation in major keys. Interval studies.

28.529 Ear Training II (2 q.h.)

Continuation of course 28.528. Solmization studies in major keys with chromatics, and in minor keys: G, F, and C clef. Conductor's beat patterns in simple and compound meter. Melodic dictation in major and minor keys. Harmonic dictation, interval studies. *Prereq.* 28.528 or equiv.

28.530 Ear Training III (2 q.h.)

Continuation of course 28.529. Advanced rhythmic, melodic, and harmonic dictation. Sight singing of one- and two-part melodies in major and minor keys, with chromatics. Modulation. Singing in 4 parts. Advanced interval studies. *Prereq.* 28.529 or equiv.

28.531 Life and Works of J. S. Bach (2 q.h.)

A comprehensive survey of the music and background of J. S. Bach with four areas of concentration: Bach and the figured bass; the young Bach (Baroque Romanticism); Bach, the churchman; Bach, the secular composer.

28.532 Life and Works of Mozart (2 q.h.)

Mozart's mastery in all fields of music with particular emphasis on his development of the symphony and his achievements in opera. The man, as seen through his letters, as performer and composer.

28.533 Life and Works of Beethoven (2 q.h.)

An analysis of the complex personality and art of this supreme musical genius. His relation to the turbulent times in which he lived; his role as the great transition figure in the passage from classicism to romanticism. His psychological and aesthetic growth will be observed by studying similar forms written in different periods of his life.

28.534 Pedagogy of Music I (2 q.h.)

Introduction to philosophy principles and procedures in the teaching of music.

28.535 Pedagogy of Music II (2 q.h.)

Procedures, program planning and techniques in teaching vocal and instrumental music. *Prereq.* 28.534 or consent of instructor prior to registration.

28.536 Pedagogy of Music III (2 q.h.)

Methods, procedures and materials of/for advanced vocal and instrumental music instruction. *Prereq.* 28.534, 28.535 or consent of instructor prior to registration.

28.540 The Black Artist in Music (2 q.h.)

General survey of Afro-American music in the U.S. traced from its origins in Africa to the present. Emphasis on jazz, its history, and an analysis of the contributions of major innovative figures. Sources and origins of jazz, as well as their contemporary extensions will be studied. Intended to introduce the student to the vast and rich expanses of black musical culture, both from a musical and a socio-historical standpoint.

28.541 Nationalism in Music (2 q.h.)

The relationship of folk song, dance, and art to symphonic literature; nationalistic elements in the music of Dvorak, Tchaikovsky, Grieg, Copland, Shostakovich, Sibelius; the effect of ideology on composers; the Soviet composers.

28.542 Music of the U.S.A. (2 q.h.)

American music from the colonial times to the present, influence of Stravinsky and Schoenberg on American composers, music for the theater, jazz, electronic music, and contemporary musical trends.

28.543 Great Choral Literature (2 q.h.)

A study of sacred and secular choral literature from medieval to contemporary times.

28.544 Chamber Music (2 q.h.)

Ensemble music for small groups. Examples for analysis are selected from the Baroque Period to contemporary styles.

28.545 Wagner's Ring Cycle (2 q.h.)

An in-depth study of Wagner's Cycle of music drama: *Das Rheingold*, *Walkure*, *Siegfried* *Götterdämmerung*, Wagner's compositional techniques (e.g., the use of leitmotif and musical metaphor) is examined in detail.

28.546 Life and Work of Stravinsky (2 q.h.)

Le Sacre, *Petrouchka*, *Symphony of Psalms*, and more recent works are given detailed attention. His contributions to twentieth-century style: neo-classicism, pandiatonicism, and additive style are analyzed and his strong influence on other composers is noted.

28.547 The Music of Bruckner and Mahler (2 q.h.)

A study of their major works and aesthetic principles. Large scale symphonic and vocal works will be examined as a culmination of nineteenth-century Romanticism and as the forerunners of twentieth-century Expressionism.

28.548 Great Love Songs Through the Ages (2 q.h.)

The music of love songs, ballads, chansons, lieder and opera arias from the Middle Ages to today, will be studied, listened to, and discussed.

28.549 A History of Musical Instruments in Western Culture (2 q.h.)

A study of the evolution of musical instruments from the Middle Ages to today. General principles of instrument construction and the historical contexts of their use through the ages will be discussed. The evolution of changing tastes in instrumental sound will be illustrated through listening to recordings and, whenever possible, through live performance. Field trips to the Boston Museum of Fine Arts (which houses an excellent early instrument collection) and to various instrument builders in the Boston area will help to give the student a first-hand view of some ancient and modern instruments.

28.550 Life and Works of Haydn (2 q.h.)

A study of his major works and aesthetic principles. Emphasis on Haydn's contributions to Symphonic form; his oratorios, masses, chamber music, songs, symphonies, and works for the keyboard.

28.551 Life and Works of Brahms (2 q.h.)

The Romantic-Classical; his technique of germinal motivic construction; a study of his symphonies, concertos, chamber music, the songs, and the Requiem.

28.552 Life and Works of Chopin (2 q.h.)

A comprehensive study of the pianoforte compositions of Chopin including the sonatas, concertos, and the shorter forms such as the waltzes, nocturnes, preludes, mazurkas, etudes, scherzos, polonaises, impromptus, and ballades.

- 28.553 Melodrama and the Macabre: Aspects of Romanticism in Music (2 q.h.)**
The focus of this course is on program music of the Romantic period dealing with strange and macabre subjects. Works studied will include Schubert's *Erlkönig*, Weber's *Der Freischütz*, and Berlioz' *Symphonie Fantastique*. Investigations will be made into the forces which produced this aspect of Romanticism with references to literature and art and how they affected the musical scene.
- 28.555 Contemporary Opera (2 q.h.)**
Almost every major composer including Schoenberg, Berg, Bartok, Stravinsky, Hindemith, and Poulenc have contributed to the opera repertory, thus illustrating twentieth-century style. Among the works studied are: *Wozzeck*, the *Rake's Progress*, *Dialogue of the Carmelites*, and *Bluebeard's Castle*.
- 28.571 Piano Class I (2 q.h.)**
Fundamentals of music and interval identification. Scales and arpeggios, hands separate. Ear training through keyboard harmony and some emphasis on ensemble playing. Repertoire requirements; early Mozart minuets, etc.
- 28.572 Piano Class II (2 q.h.)**
Scales and arpeggios, hands together. Primary triads in some major and minor keys for improvisation and ear playing. Sight playing and some duet performances. Repertoire: Anna Magdalena. Notebook by J. S. Bach. *Prereq.* 28.571 or *equiv.*, or consent of instructor prior to registration.
- 28.573 Piano Class III (2 q.h.)**
Scales and arpeggios, hands together (2 octaves). Primary triads in all keys adding secondary triads in some keys. Transposition of simple tunes, including The National Anthem, using own accompaniment in all keys. Sight playing, Diller—Quaille Book II, Repertoire: *Complete Oxford Piano Course*. *Prereq.* 28.572 or *equiv.*, or consent of instructor prior to registration.
- 28.590 Directed Study (2 q.h.)**
Independent work under the direction of the department upon a chosen topic. Limited to qualified students with approval of department chairman. *Prereq.* Dept. approval.
- 28.591 Off-Broadway Musical Seminar (2 q.h.)**
A survey of the music and forms of musicals other than the traditional Broadway show. New York, off-Broadway, and community theater will be studied. Specific off-Broadway musicals will be analyzed in depth.
- 28.595 Opera Seminar (2 q.h.)**
An historical survey of opera. Students will attend performances of several operas and write critical reviews.
- 28.597 Symphony Seminar (2 q.h.)**
An historical survey and analytic study of the symphony orchestra. Students will attend performances of several different symphony orchestras and write critical reviews.
- 28.598 Musical Comedy Seminar (2 q.h.)**
An historical survey and analytic study of musical shows. Students will attend performances and write critical reviews.

28.599 Theory I—Tonal Techniques A (2 q.h.)

Fundamentals. Pitch and rhythmic notation, scales, intervals, chord construction. Basic ear training; melodic and rhythmic dictation.

28.600 Theory II—Tonal Techniques B (2 q.h.)

Chord progression. Realization of figured bass, voice leading, harmonic rhythm. Non-harmonic tones. Melodic and rhythmic dictation. *Prereq.* 28.599 or equiv. or consent of instructor prior to registration.

28.601 Theory III—Eighteenth-Century Harmonic Practice (2 q.h.)

Choral analysis. Seventh chords, secondary dominants, modulation. Melodic and rhythmic dictation. *Prereq.* 28.600 or equiv. or consent of instructor prior to registration.

28.602 Music History I—Musical Literature to 1750 (2 q.h.)

A study of sacred and secular musical literature from the early Middle Ages through the Baroque. Listening to and discussion of monophony, organum, music of the troubadours and trouveres; motets, masses, and secular music by Machaut, Dufay, Josquin, Palestrina, Byrd; Elizabethan music, both vocal and instrumental; early Italian opera; music of the German protestants culminating in the works of Bach and Handel will give the student an evolutionary view of music history and style during this period.

28.603 Music History II—Music of the Classical Period (2 q.h.)

A study of changing musical styles from Stamitz, and the Mannheim School through the works of Haydn, Mozart, and early Beethoven.

28.604 Music History III—Music of the Romantic Era (2 q.h.)

Musical styles of the nineteenth century. The role of music and the musician in the changing social, economic, political and cultural structure of Europe. Music by Beethoven, Schubert, Berlioz, Brahms, Verdi and Wagner will be heard discussed and analyzed.

28.605 Theory IV (2 q.h.)

Non-dominant seventh, ninth, eleventh, and thirteenth chords. Linear embellishment of harmony and harmonization of melody. Keyboard harmony. Melodic and rhythmic dictation; part singing. *Prereq.* 28.601 or equiv. or consent of instructor prior to registration.

28.606 Theory V (2 q.h.)

Analysis of appropriate period forms and compositions. Chromatic and other non-diatonic harmony. Advanced modulation. Keyboard harmony. Melodic-rhythmic dictation and part singing. *Prereq.* 28.605 or equiv. or consent of instructor prior to registration.

28.607 Theory VI (2 q.h.)

Continuing analysis of compositions and period forms. Modern chord symbols. Basic principles of serial writing. Keyboard harmony. Melodic-rhythmic dictation and part singing. *Prereq.* 28.606 or equiv. or consent of instructor prior to registration.

28.608 Contrapuntal Technique I (2 q.h.)

A study of sixteenth-century counterpoint. *Prereq.* 28.599 or equiv.

28.609 Contrapuntal Techniques II (2 q.h.)

A study of seventeenth- and eighteenth-century counterpoint. *Prereq.* 28.608 or equiv. or consent of instructor prior to registration.

28.611 Musical Performance I (1 q.h.)

Participation in rehearsals and public performances and/or research, composition, arranging, conducting, solo and ensemble activity, etc., with the NU Symphony Orchestra, the Early Music Players, the NU Chorus, the NU Bands, or other ensembles under the supervision and coaching of a faculty member of the Department of Music. The student's progress will be evaluated at the end of the quarter by audition or otherwise. *Prereq.* audition or permission of instructor.

28.612 Musical Performance II (1 q.h.)

Prereq. audition or permission of instructor.

28.613 Musical Performance III (1 q.h.)

Prereq. audition or permission of instructor.

28.614 Musical Performance IV (1 q.h.)

Prereq. audition or permission of instructor.

28.695 Honors Program I (4 q.h.)

Prereq. permission of Dean.

28.696 Honors Program II (4 q.h.)

Prereq. 28.695.

28.697 Honors Program III (4 q.h.)

Prereq. 28.696.

29—SPEECH AND THEATRE ARTS

Consultant: Prof. E. J. Blackman, Chairman, Drama and Speech Dept. (L.A. College)

29.501 Effective Speaking I (2 q.h.)

Selection and organization of speech materials, essentials of good platform delivery, individual and class criticism of both prepared and impromptu speeches. A practical course devoted to developing an ability to speak easily, naturally, and forcefully.

29.502 Effective Speaking II (2 q.h.)

This course builds upon the techniques and principles developed in Effective Speaking I by stressing increased student proficiency. Speech organization and delivery of more complex materials with which the student is likely to be confronted in business, industry, or the professions will be studied. *Prereq.* 29.501.

29.503 Effective Speaking III (2 q.h.)

The individual speaker as part of a group. The role of discussion in problem analysis, problem solving, and policy making. The principles and methods of organizing and participating in group discussions. Parliamentary procedure. Prereq. 29.502.

29.504 Voice and Articulation I (2 q.h.)

A practical course aimed at developing the speaking voice; special emphasis on articulation, pitch control, vocal variety, and flexibility; basic theory of the vocal mechanism.

29.505 Voice and Articulation II (2 q.h.)

Study of the science of speech sounds, investigation of regionalisms, individual voice development. Prereq. 29.504.

29.506 Oral Interpretation (2 q.h.)

Application of basic vocal techniques to the dramatic interpretation of various forms of literature.

29.507 Business and Professional Speaking (2 q.h.)

Practice in the organization and presentation of material to fit varying audiences. Emphasis on techniques of delivery and effective presentation of ideas.

29.508 Argumentation and Discussion (2 q.h.)

Designed to acquaint the student with the basic concepts of argumentation (evidence, research, refutation). Emphasis is placed on the psychology of an audience and various types of group discussion.

29.509 Parliamentary Procedure (2 q.h.)

Methods of conducting and organizing meetings. Development of effective leadership techniques. Experience in chairing a meeting and applying rules of order.

29.511 Introduction to Theatre Arts (2 q.h.)

A course aimed at developing in theatregoers an appreciation of the total theatre experience, by studying the roles played by the artists and craftsmen of the theatre in bringing the playwright's script to life. The role of the director, actors, and designers. The role of the audience as critics.

29.521 Introduction to Dramatic Literature (2 q.h.)

The relationship between drama as literature and as theatre. Types of drama: comedy, tragedy, melodrama, farce, and drawing-room comedy. The dramatist's attitude and his style: Classicism, Romanticism, Realism, Naturalism, and Theatricalism.

29.522 Masters of the Theatre I (2 q.h.)

The plays in relationship to their times, the theatres in which they were performed, and the dramatic theory of the age. An examination of selected plays from the Classical Greek and Roman, Medieval religious and secular, and Elizabethan theatre.

29.523 Masters of the Theatre II (2 q.h.)

The art of the Italian commedia dell'arte, the Neoclassic theatre of Racine, Moliere, and Dryden, the Restoration theatre, and the plays of Goldsmith and Sheridan.

29.524 Modern European Drama (2 q.h.)

An examination of European drama of the late nineteenth century and of the twentieth century reflecting the changing views toward the nature of man and the techniques of theatre.

29.525 Modern British Drama (2 q.h.)

The drama of England and Ireland of the twentieth century reflecting the impact of modern life upon modern theatre.

29.526 Modern American Drama (2 q.h.)

A view of American drama from 1900 to the present time. The American playwright reflecting the social, philosophical, and psychological temper.

29.531 Contemporary Film (2 q.h.)

A survey of world film from the days of Edison's experiments to the present. Evaluation and critical review of representative films. Viewing of outstanding films.

29.535 Workshop in Play Production I (2 q.h.)

Training for the beginning director of plays. The organization of the producing unit. Play selection. Casting. Script analysis. Production style. Creating the floor plan. Directing simple scenes in the proscenium theatre.

29.536 Workshop in Play Production II (2 q.h.)

Studying of composition and picturization. Rehearsal techniques. Directing of simple scenes. *Prereq.* 29.535.

29.537 Workshop in Play Production III (2 q.h.)

Directing in the arena theatre, as well as in proscenium theatre. *Prereq.* 29.536.

29.541 Workshop for the Actor I (2 q.h.)

Physical preparation. Basic stage movement and deportment; the control of the stage voice; the analysis and establishment of characterization through observation and awareness of the body; improvisations and short scenes.

29.542 Workshop for the Actor II (2 q.h.)

Psychological preparation. The analysis and establishment of characterization through memory, emotion, imagination, and recall. Analysis of specific roles, the creation of a character analysis book, improvisations and short scenes.

29.543 Workshop for the Actor III (2 q.h.)

Preparing and performing the role. The physical and psychological preparation of specific roles. Short classroom scenes; the presentation of a one-act play.

29.561 Announcing I (2 q.h.)

A course dealing with the delivery of all types of radio commercials.

29.562 Announcing II (2 q.h.)

A course dealing with the delivery of prepared as well as ad lib materials so that the announcer may strengthen his spontaneous broadcast speech abilities. *Prereq.* 29.561.

29.563 Announcing III (2 q.h.)

A course dealing with a variety of ad lib program types in both radio and television to aid the announcer in developing his ability to think quickly and speak fluidly and dynamically. Prereq. 29.562.

29.595 Charles Playhouse Seminar (2 q.h.)

A seminar designed to teach students how to appreciate the experience of theatre-going through pre-show preparation and post-show critique, under the guidance of a faculty member as well as Charles Theatre artistic personnel.

29.596 New York Theatre Seminar (2 q.h.)

A seminar aimed at introducing the theatre arts to students by varied theatre going experiences as well as formal class discussions and studying the role of the New York stage in shaping contemporary American theatre.

29.597 London Theatre Seminar (2 q.h.)

Examination of the contemporary London theatre scene by viewing and evaluating representative productions.

29.598 Stratford Shakespeare Seminar (2 q.h.)

Seminar designed to give students an opportunity to attend four performances at the Stratford Festival Theatre: to meet with Festival actors, directors, designers; to tour the theatre plant; and to evaluate contemporary Shakespearian productions.

29.599 Creative Dramatics

Theories and methods of relating the creative techniques of pantomime, improvisations, dramatization, to work with children's programs in schools, churches, recreation facilities.

29.600 Children's Theatre

Analysis and creation of dramatic literature for children; the developing of a production for children.

30—ENGLISH

Consultant: Prof. P. C. Wermuth, Chairman, English Dept. (L.A. College)

Assoc. Consultants: Dean H. Vetstein (L.A. College)

Prof. M. Lesser (L.A. College)

Each student enrolled in Composition and Rhetoric (30.601 and 30.603) will take a Placement Examination during class. Some students may be requested to register for Elements of Composition (30.600) a 2 q.h. course designed to upgrade the student's background.

Courses required for Liberal Arts Majors are:

30.601, 30.602 Composition and Rhetoric I & II (or 30.603 Intensive)
and

30.604, 30.605 Introduction to Literary Forms I & II (or 30.606 Intensive)
For other majors, refer to English requirement listed under major.

During the changeover of English requirements, the following will apply:

Students who have successively completed:

30.504 may register for 30.602

30.505 may register for 30.604

30.507 may register for 30.605

30.501 English for International Students I (2 cl., non-credit)

Introduction to English grammar for foreign-speaking students with an emphasis on listening, speaking, and writing; selected readings and exercises to strengthen vocabulary and pronunciation.

30.502 English for International Students II (2 cl., non-credit)

A continuation of 30.501 emphasizing the preparation of written and oral reports, and business and social correspondence.

30.503 English for International Students III (2 cl., non-credit)

Advanced work in written and spoken English preparatory to entering 30.601, Composition and Rhetoric I.

30.511 Business Writing and Reports I (2 q.h.)

Developing an appropriate vocabulary and a business letter-writing philosophy.

30.512 Business Writing and Reports II (2 q.h.)

Planning, writing, and analyzing effective business letters. *Prereq.* 30.511 or equiv.

30.513 Business Writing and Reports III (2 q.h.)

Researching, organizing, documenting, and writing semi-technical and business reports. *Prereq.* 30.512 or equiv.

30.514 Technical Writing I (2 q.h.)

Introduction to types of technical documentation, memoranda, and technical reports. Writing of reports. *Prereq.* 30.506 or equiv.

30.515 Technical Writing II (2 q.h.)

Proposals, technical manuals and graphic aids for printed documents and presentations. *Prereq.* 30.514 or equiv.

30.516 Technical Writing III (2 q.h.)

Technical writing, editing, and documentation, including information retrieval, programmed instruction, and reproduction processes. *Prereq.* 30.515 or equiv.

30.517 Intermediate Writing (2 q.h.)

Practice in expository and imaginative writing in a variety of forms, designed to help the student discover his own style. Individual attention to the student's work. *Prereq.* 30.506, 30.602 or equiv.

30.518 Creative Writing I (2 q.h.)

A workshop in writing short fiction. *Prereq.* 30.517 or equiv.

30.519 Creative Writing II (2 q.h.)

A workshop in analyzing and editing the participants' short fiction. *Prereq.* 30.518 or equiv.

30.522 Introduction to Semantics I (2 q.h.)

The effect of language habits on thinking processes and on social relationships. *Prereq.* 30.506, 30.509, or equiv.

30.523 Introduction to Semantics II (2 q.h.)

A formulaic examination of language. *Prereq.* 30.522 or equiv.

30.525 The English Language I (2 q.h.)

An introduction to the scientific study of the backgrounds and historical development of the English language. *Prereq.* 30.506, 30.509 or equiv.

30.526 The English Language II (2 q.h.)

An examination of sounds, grammar, and usage. *Prereq.* 30.525 or equiv.

30.527 The English Language III (2 q.h.)

The problem of meaning and the symbolic nature of language. *Prereq.* 30.526 or equiv.

30.531 Western World Literature I (2 q.h.)

The Classical Age.

30.532 Western World Literature II (2 q.h.)

The Bible and the Middle Ages.

30.533 Western World Literature III (2 q.h.)

The Renaissance.

30.534 Western World Literature IV (2 q.h.)

The Neoclassical Age.

30.535 Western World Literature V (2 q.h.)

The Enlightenment.

30.536 Western World Literature VI (2 q.h.)

The Romantic Age and the rise of realism.

30.537 Modern Irish Literature I (2 q.h.)

Irish literature in English from 1885 to 1920 (fiction, drama, and verse). Concentration will be on such major figures as the early Yeats, Synge, Lady Gregory, O'Flaherty, and the early Joyce.

30.538 Modern Irish Literature II (2 q.h.)

Irish literature in English from 1920 to the present (fiction, drama, and verse). Concentration will be on such major figures as the later Yeats, O'Casey, O'Faolain, the later Joyce, O'Connor, Behan, Lavin, and Montague.

- 30.539 The Irish Influence in Selected Modern American Literature** (2 q.h.)
A survey of the Irish imagination, themes, and attitudes as embodied in the fiction and drama of a number of Twentieth-Century American writers: O'Neill's "Touch of the Poet," Donleavy's "Ginger Man," O'Connor's "Last Hurrah," Alfred's "Hogan's Goat," and McHale's "Farragan's Retreat." (Partially fulfills American Literature requirement for majors).
- 30.541 English Literature I** (2 q.h.)
From early English to 1700.
- 30.542 English Literature II** (2 q.h.)
From Neoclassicism to Romanticism.
- 30.543 English Literature III** (2 q.h.)
From the Victorian Age to the present.
- 30.544 American Literature I** (2 q.h.)
From Colonial times to Poe.
- 30.545 American Literature II** (2 q.h.)
The American Renaissance: Emerson, Thoreau, Hawthorne, Melville, and Whitman.
- 30.546 American Literature III** (2 q.h.)
From 1865 to the present.
- 30.547 Science Fiction** (2 q.h.)
The myths and rhetorical strategies of science fiction from Mary Shelley's *Frankenstein* through such authors as Vonnegut, Bradbury, Heinlein, and Clarke.
- 30.548 Images of Women in Literature** (2 q.h.)
A descriptive and analytic study of the images of women and the archetypes underlying them in imaginative literature, including such writers as Homer, Austen, Ibsen, Lawrence, Mailer, and Plath.
- 30.551 Chaucer I** (2 q.h.)
"The Canterbury Tales," with attention to Middle English vocabulary, historical setting, and the rhythms and devices of Chaucer's poetry.
- 30.552 Chaucer II** (2 q.h.)
More of "The Canterbury Tales," and a beginning in the text of "Troilus and Criseyde." *Prereq.* 30.551 or *equiv.*
- 30.553 Chaucer III** (2 q.h.)
An emphasis on "Troilus and Criseyde," and on certain shorter works of Chaucer. *Prereq.* 30.552 or *equiv.*
- 30.554 Shakespeare I** (2 q.h.)
The Elizabethan theatre, Shakespeare's England, and the pre-1600 plays.
- 30.555 Shakespeare II** (2 q.h.)
The "problematical" comedies and the histories. *Prereq.* 30.554 or *equiv.*

30.556 Shakespeare III (2 q.h.)

Emphasis on the major tragedies of Shakespeare. *Prereq.* 30.555 or equiv.

30.557 The Seventeenth Century (2 q.h.)

The literature of the Restoration.

30.558 The Eighteenth Century I (2 q.h.)

The age of Pope and Swift.

30.559 The Eighteenth Century II (2 q.h.)

The age of Johnson.

30.561 Spenser (2 q.h.)

"The Faerie Queene," studied as the English culmination of Medieval and Renaissance romantic narrative.

30.562 Milton (2 q.h.)

Close reading of "Paradise Lost," and of such political and theological background as needed. "Samson Agonistes" will also be read.

30.564 The Old Testament I (2 q.h.)

Selected books from the Old Testament examined for their literary and historical importance.

30.565 The Old Testament II (2 q.h.)

Continuation of 30.564.

30.566 The New Testament (2 q.h.)

Selected books from the New Testament considered in their literary and historical aspects.

30.571 The Nineteenth Century I (2 q.h.)

Wordsworth and Coleridge.

30.572 The Nineteenth Century II (2 q.h.)

Byron, Shelley, and Keats.

30.573 The Nineteenth Century III (2 q.h.)

The Victorian Age.

30.574 The Eighteenth-Century English Novel (2 q.h.)

From Defoe to Austen.

30.575 The Nineteenth-Century English Novel (2 q.h.)

From Bronte to Hardy.

30.576 The Twentieth-Century English Novel (2 q.h.)

From Conrad to the present.

30.577 Conrad (2 q.h.)

Conrad's art related to his Polish heritage, nautical career, theory of life and composition, and literary legacy.

30.578 Afro-American Literature (2 q.h.)

A study of representative black authors of the United States, emphasizing the period from the Civil War to the present.

30.581 The American Short Story (2 q.h.)

The development of the American short story from its nineteenth-century origins to the present.

30.582 The Nineteenth-Century American Novel (2 q.h.)

From Cooper to Crane.

30.583 The Twentieth-Century American Novel (2 q.h.)

From Dreiser to the present.

30.584 Contemporary American Poetry (2 q.h.)

From Frost to the present.

30.585 The Modern European Novel (2 q.h.)

From Proust to the present.

30.586 Literary Criticism (2 q.h.)

Major schools of criticism through a study of Aristotle, Longinus, Sidney, Johnson, and a representative group of moderns.

30.590 Writers' Conference (2 q.h.)

A workshop in which professional writers will analyze participants' manuscripts.

30.591 Honors Program I (4 q.h.) See page 80.

30.592 Honors Program II (4 q.h.) Prereq. 30.591.

30.593 Honors Program III (4 q.h.) Prereq. 30.592.

30.600 Element of Composition (2 q.h.)

An intensive study of grammatical forms and structural patterns of current English.

30.601 Composition and Rhetoric I (2 q.h.)

A detailed examination of the modes of rhetoric, especially exposition and argument, and exercises in the development of paragraphs and short papers. *(Not open to students who have credit for 30.504.)*

30.602 Composition and Rhetoric II (2 q.h.)

A continuation of 30.601. The stress here is on the short paper, the longer library paper, and formal documentation. *(Not open to students who have credit for 30.505.)*

30.603 Composition and Rhetoric (Intensive) (4 q.h.)

Same as 30.601 plus 30.602.

30.604 Introduction to Literary Forms I (2 q.h.)

The development of techniques for reading imaginative writing. Short and long fiction are the materials for study, discussion, and two critical papers.

30.605 Introduction to Literary Forms II (2 q.h.)

A continuation of 30.604, but here the materials are poetry and drama.

30.606 Introduction to Literary Forms (Intensive) (4 q.h.)

Same as 30.604 *plus* 30.605.

30.607 The Modern Novel (2 q.h.)

An introductory course in the structure and themes of twentieth-century American, British, and European novels; reading of such writers as Hemingway, and Faulkner, Joyce and Lawrence, Kafka and Camus.

31—FRENCH

Consultant: Prof. L. Cooperstein, Chairman, Modern Language Dept. (L.A. College)

31.601 Elementary French I (4 q.h.)

Essentials of grammar, practice in pronunciation, and progressive acquisition of a basic vocabulary and idiomatic expressions.

31.602 Elementary French II (4 q.h.)

Continuation of grammar study. Oral and written exercises. *Prereq.* 31.601 or *equiv.*

31.603 Elementary French III (4 q.h.)

Reading of French prose of increasing difficulty, with written and oral exercises based on the materials read; practice in conversation. *Prereq.* 31.602 or *equiv.*

31.604 Intermediate French I (4 q.h.)

A review of grammar, with practice in composition and conversation. *Prereq.* 31.603 or *equiv.*

31.605 Intermediate French II (4 q.h.)

History of French civilization, with discussions and conversation. *Prereq.* 31.604 or *equiv.*

31.606 Intermediate French III (4 q.h.)

Intensive reading of modern French prose, with conversational practice. *Prereq.* 31.605 or *equiv.*

31.607 Elementary French (Intensive) (12 q.h.)

Stresses the essentials of grammar, practice in pronunciation, and progressive acquisition of a basic vocabulary with idiomatic expressions. Written and oral exercises are based upon simple French prose. Develops into the reading of more difficult work accompanied by practice in conversation. Not open to students who have taken 31.601, 31.602, 31.603.

31.608 Intermediate French (Intensive) (12 q.h.)

Same as 31.604, 31.605 and 31.606. Not open to students who have taken 31.604, 31.605, 31.606.

31.521 French Literature I (2 q.h.)

Origins of French literature with readings from major works of the Middle Ages. *Prereq.* 31.506 or *equiv.*

31.522 French Literature II (2 q.h.)

Selections from the Classical period in the seventeenth and eighteenth centuries. *Prereq.* 31.521 or *equiv.*

31.523 French Literature III (2 q.h.)

Readings from major works of the nineteenth and twentieth centuries. *Prereq.* 31.522 or *equiv.*

32—SPANISH

32.601 Elementary Spanish I (4 q.h.)

Essentials of grammar, practice in pronunciation, progressive acquisition of a basic vocabulary and idiomatic expressions.

32.602 Elementary Spanish II (4 q.h.)

Continuation of grammar study. Oral and written exercises; reading of Spanish prose of moderate difficulty. *Prereq.* 32.601 or *equiv.*

32.603 Elementary Spanish III (4 q.h.)

Continuation of grammar study. Oral and written exercises; reading of Spanish prose of moderate difficulty. *Prereq.* 32.602 or *equiv.*

32.607 Elementary Spanish (Intensive) (12 q.h.)

Stresses the essentials of grammar, practice in pronunciation, and progressive acquisition of a basic vocabulary with idiomatic expressions. Written and oral exercises are based upon simple Spanish prose. Develops into the reading of more difficult work accompanied by practice in conversation. Not open to students who have taken 32.601, 32.602, 32.603.

32.604 Intermediate Spanish I (4 q.h.)

Review of grammar, with practice in composition and conversation. *Prereq.* 32.603, 32.611 or *equiv.*

32.605 Intermediate Spanish II (4 q.h.)

Spanish civilization through texts of average difficulty. Intensive reading of modern prose, with occasional oral or written translation; conversation practice based on assigned readings. *Prereq.* 32.604 or *equiv.*

32.606. Intermediate Spanish III (4 q.h.)

Spanish-American civilization through texts of average difficulty. Intensive reading of modern prose, with occasional oral or written translation; conversation practice based on assigned readings. *Prereq.* 32.605 or *equiv.*

32.608 Intermediate Spanish (Intensive) (12 q.h.)

Same as 32.604, 32.605 and 32.606. Not open to students who have had 32.604, 32.605, 32.606.

32.609 Conversational Spanish I* (4 q.h.)

This course is intended to provide students with a basic speaking ability and understanding of everyday Spanish. (no previous background needed.)

32.610 Conversational Spanish II* (4 q.h.)

Continued building of basic skills in conversational Spanish. *Prereq.* 32.609 or equiv.

32.611 Conversational Spanish III* (4 q.h.)

A continuation of 32.610 *Prereq.* 32.610 or equiv.

32.621 Spanish Literature I (2 q.h.)

Origins of Spanish literature with readings from major works of the Middle Ages, the Romancero, and Mysticism. *Prereq.* 32.606 or equiv.

32.622 Spanish Literature II (2 q.h.)

Selections from Cervantes and other major figures of the Siglo de Oro. *Prereq.* 32.621 or equiv.

32.623 Spanish Literature III (2 q.h.)

Readings from major works of the nineteenth and twentieth centuries. *Prereq.* 32.622 or equiv.

33—GERMAN

33.601 Elementary German I (4 q.h.)

Essentials of grammar; practice in pronunciation; progressive acquisition of a basic vocabulary and idiomatic expressions.

33.602 Elementary German II (4 q.h.)

More difficult points of grammar—particularly uses of subjunctive mood. *Prereq.* 33.601 or equiv.

33.603 Elementary German III (4 q.h.)

Reading of simple German prose, with oral and written exercises based on material read; German conversation encouraged. *Prereq.* 33.602 or equiv.

33.604 Intermediate German I (4 q.h.)

A review of grammar, with practice in composition and conversation. *Prereq.* 33.603 or equiv.

33.605 Intermediate German II (4 q.h.)

History of German civilization, with discussions and conversation. *Prereq.* 33.604 or equiv.

33.606 Intermediate German III (4 q.h.)

Intensive reading of modern German prose, with conversational practice. *Prereq.* 33.605 or equiv.

*Will satisfy the elementary language requirement only.

34—RUSSIAN

34.601 Elementary Russian I (4 q.h.)

Essentials of grammar; practice in pronunciation and progressive acquisition of a base vocabulary; idiomatic expressions.

34.602 Elementary Russian II (4 q.h.)

Continuation of grammar study; oral and written exercises. *Prereq.* 34.601 or *equiv.*

34.603 Elementary Russian III (4 q.h.)

Reading of Russian prose of moderate difficulty. *Prereq.* 34.602 or *equiv.*

34.604 Intermediate Russian I (4 q.h.)

Graded reading from the works of Pushkin, Lermontov, and Turgenev; oral and written practice based on the covered material. *Prereq.* 34.603 or *equiv.*

34.605 Intermediate Russian II (4 q.h.)

Russian history and civilization through texts of average difficulty; oral practice and composition based on covered material. *Prereq.* 34.604 or *equiv.*

34.606 Intermediate Russian III (4 q.h.)

Russian history and civilization through texts of average difficulty; oral practice and composition based on covered material. *Prereq.* 34.605 or *equiv.*

34—JAPANESE

34.621 Elementary Japanese I (4 q.h.)

Essentials of grammar; practice in pronunciation and progressive acquisition of a basic vocabulary; idiomatic expressions.

34.622 Elementary Japanese II (4 q.h.)

Continuation of grammar study; oral and written exercises. *Prereq.* 34.621 or *equiv.*

34.623 Elementary Japanese III (4 q.h.)

Reading of Japanese prose of moderate difficulty. *Prereq.* 34.622 or *equiv.*

34.624 Intermediate Japanese I (4 q.h.)

Review of grammar, with practice in composition and conversation. *Prereq.* 34.623 or *equiv.*

34.625 Intermediate Japanese II (4 q.h.)

Japanese history and civilization through texts of average difficulty; oral practice and composition based on covered material. *Prereq.* 34.624 or *equiv.*

34.626 Intermediate Japanese III (4 q.h.)

Japanese history and civilization through texts of average difficulty; oral practice and composition based on covered material. *Prereq.* 34.625 or *equiv.*

34—ITALIAN**34.631 Elementary Italian I (4 q.h.)**

Essentials of grammar; practice in pronunciation; and progressive acquisition of a basic vocabulary and idiomatic expressions.

34.632 Elementary Italian II (4 q.h.)

Continuation of grammar study. Oral and written exercises. *Prereq.* 34.631 or *equiv.*

34.633 Elementary Italian III (4 q.h.)

Reading of Italian prose of increasing difficulty; with written and oral exercises based on the material read; practice in conversation. *Prereq.* 34.632 or *equiv.*

34.634 Intermediate Italian I (4 q.h.)

A review of grammar, with practice in composition and conversation. *Prereq.* 34.633 or *equiv.*

34.635 Intermediate Italian II (4 q.h.)

History of Italian civilization with discussions and conversation. *Prereq.* 34.634 or *equiv.*

34.636 Intermediate Italian III (4 q.h.)

Intensive reading of modern Italian prose, with conversational practice. *Prereq.* 34.635 or *equiv.*

34—SWAHILI**34.641 Elementary Swahili I (4 q.h.)**

Essentials of grammar; practice in pronunciation and progressive acquisition of a basic vocabulary; idiomatic expressions.

34.642 Elementary Swahili II (4 q.h.)

Continuation of grammar study; oral and written exercises. *Prereq.* 34.641 or *equiv.*

34.643 Elementary Swahili III (4 q.h.)

Reading of Swahili prose of moderate difficulty. *Prereq.* 34.642 or *equiv.*

34.644 Intermediate Swahili I (4 q.h.)

Review of grammar, with practice in composition and conversation. *Prereq.* 34.643 or *equiv.*

34.645 Intermediate Swahili II (4 q.h.)

Swahili history and civilization through texts of average difficulty; oral practice and composition based on covered material. *Prereq.* 34.644 or *equiv.*

34.646 Intermediate Swahili III (4 q.h.)

Swahili history and civilization through texts of average difficulty; oral practice and composition based on covered material. *Prereq.* 34.645 or *equiv.*

34—CHINESE**34.651 Mandarin Chinese I (4 q.h.)**

An introduction to sounds and structure of spoken and written Chinese (the standard or "national language"—*kuo-yu*). Stresses essentials of grammar, sentence pattern drills.

34.652 Mandarin Chinese II (4 q.h.)

Continuation of Chinese I. Essentials of grammar, reading of simple written Chinese. *Prereq.* 34.651 or *equiv.*

34.653 Mandarin Chinese III (4 q.h.)

Continuation of Chinese II. Grammar, reading Chinese with conversational drill to be based on material covered in class. *Prereq.* 34.652 or *equiv.*

38—JOURNALISM

Consultant: Prof. G. A. Speers, Chairman, Journalism Dept. (L.A. College)

38.501 History and Principles of Journalism I (2 q.h.)

Journalism from its European origins into the colonial period. The evolution of press freedoms and principles now and in the colonial press and the party press.

38.502 History and Principles of Journalism II (2 q.h.)

Journalism from 1800. The "Dark Period," the "Penny Press," and the great personal journalists: Bryant, Bennett, Greeley, Raymond, and others. *Prereq.* 38.501 or *equiv.*

38.503 History and Principles of Journalism III (2 q.h.)

The "giants" of American journalism in the closing decades of the nineteenth century: Dana, Greeley, Ochs, White, Medill, Pulitzer, Hearst, and others. *Prereq.* 38.502 or *equiv.*

38.504 Newswriting I (2 q.h.)

Obtaining and organizing facts; the writing of basic news stories. Subjects covered include the five "W's" and the "H" of news, inverted pyramid form, news values, and leads.

38.505 Newswriting II (2 q.h.)

Analysis of different types of news stories through assignments and class discussions; building news stories; news interview stories, and other types. *Prereq.* 38.504.

38.506 Newswriting III (2 q.h.)

Investigative reporting, feature stories, editorials. Copy editing exercises and assignments in specialized writing. Libel, slander, and other legal matters affecting journalism. *Prereq.* 38.505 or *equiv.*

38.507 Techniques of Journalism I (2 q.h.)

Techniques of journalism, stressing actual assignments and classroom discussion of students' work. Course applies basic newswriting practices to assignments.

38.508 Techniques of Journalism II (2 q.h.)

Focus on handling stories that emanate from various "beats," including courts, government beats, and investigative reporting. *Prereq.* 38.507 or *equiv.*

38.509 Techniques of Journalism III (2 q.h.)

Concentration on fields of "specialties" of business, sports, editorials, and student development of a special project in journalism. *Prereq.* 38.508 or *equiv.*

39—ECONOMICS

Consultant: Prof. M. A. Horowitz, Chairman, Economic Dept. (L.A. College)
Associate Consultant: Prof. H. Goldstein (L.A. College)

39.501 Economic Principles and Problems I (2 q.h.)

Macro analysis—national income concepts and determination; macro economic goals and problems; monetary and fiscal policy.

39.502 Economic Principles and Problems II (2 q.h.)

Micro analysis—theory of the firm and market structure; supply, demand, market price; international economics. *Prereq.* 39.501 or *equiv.*

39.503 Economic Principles and Problems III (2 q.h.)

Applications of economic principles to selected problem areas; poverty, competition, labor, agriculture, urban. *Prereq.* 39.502 or *equiv.*

39.504 Economics (Intensive) (6 q.h.)

Macro analysis—national income concepts and determination; macro economic goals and problems; monetary and fiscal policy. Micro analysis—theory of the firm and market structure; supply, demand, market price; international economics. Applications of economic principles to selected problem areas: poverty, competition, labor, agriculture, urban. Not open to students who have taken 39.501, 39.502, 39.503.

39.505 Economics A (3 q.h.)

Same as 39.501 plus the first half of 39.502.

39.506 Economics B (3 q.h.)

Same as the second half of 39.502 plus 39.503. *Prereq.* 39.505 or *equiv.*

39.507 Intermediate Economic Theory I (2 q.h.)

Classical equilibrium theory. Theory of demand, supply, and the market price. Marginal analysis. *Prereq.* 39.503 or *equiv.*

39.508 Intermediate Economic Theory II (2 q.h.)

Determination of price and output in the context of the theory of the firm. *Prereq.* 39.507 or *equiv.*

39.509 Intermediate Economic Theory III (2 q.h.)

Introduction to mathematical analysis and a comprehensive analysis of the theory of distribution. *Prereq.* 39.508 or *equiv.*

39.511 Statistics I (2 q.h.)

Introduction to the collection and organization of data. Concentration on the nature, computation, and uses of measures of central tendency and variability. *Prereq.* 39.503 or equiv.

39.512 Statistics II (2 q.h.)

Introduction to statistical inference, parameters of samples, tests of significance, "t" distribution, and chi square. *Prereq.* 39.511 or equiv.

39.513 Statistics III (2 q.h.)

Introduction to the analysis of variance, trend fitting, linear regression, seasonal adjustment, and index numbers. *Prereq.* 39.512 or equiv.

39.514 Statistics (Intensive) (6 q.h.)

Introduction to the collection and organization of data. Concentration on the nature, computation, and uses of measures of central tendency and variability. Introduction to statistical inference, parameters of samples, tests of significance, "t" distribution, and chi square. Introduction to the analysis of variance, trend fitting, linear regression, seasonal adjustment, and index numbers. Not open to students who have taken 39.511, 39.512, 39.513. *Prereq.* 39.503 or equiv.

39.517 Money and Banking I (2 q.h.)

Introduction to money and credit, commercial banking structure, and money creation; problems and policy of central banking in the United States. *Prereq.* 39.503 or equiv.

39.518 Money and Banking II (2 q.h.)

Theory of money and prices and monetary policy; interest theory, debt management, and international monetary problems and analysis. *Prereq.* 39.517 or equiv.

39.519 Public Finance (2 q.h.)

Analysis of the growth and development of the public sector of the economy. Public finance policies, intergovernment fiscal relations. *Prereq.* 39.518 or equiv.

39.521 Economic Growth and Development I (2 q.h.)

Analysis of the development of the western market system. Introduction to economic growth and alternative approaches to economic development. *Prereq.* 39.503 or equiv.

39.522 Economic Growth and Development II (2 q.h.)

An introductory analysis of the role of economic factors and institutions as well as an examination of the effect of psychological social and political influences upon economic development. *Prereq.* 39.521 or equiv.

39.523 Government and Business I (2 q.h.)

Role of Government in national economic affairs—theory and practice. *Prereq.* 39.503 or equiv.

39.524 Government and Business II (2 q.h.)

The relationship between government and business and anti-trust laws. *Prereq.* 39.523 or equiv.

39.525 American Economic History (2 q.h.)

Economic development of the United States with emphasis upon the post Civil War period and selected European developments. *Prereq.* 39.503 or equiv.

39.526 Government and Business III (2 q.h.)

Application of anti-trust laws to business—emphasis upon cases, principles, and current anti-trust problems. *Prereq.* 39.524 or equiv.

39.527 Labor Economics (2 q.h.)

Development of labor organizations, their aims and methods. Issues in collective bargaining and public policy toward labor. *Prereq.* 39.503 or equiv.

39.528 International Economics I (2 q.h.)

Economics of international trade, tariffs and resource use, and balance of payments mechanisms. *Prereq.* 39.503 or equiv.

39.529 International Economics II (2 q.h.)

International commercial policy, financial organizations, and recent problems. *Prereq.* 39.528 or equiv.

39.530 Comparative Economic Systems (2 q.h.)

Analysis and evaluation of different economic systems: capitalism, socialism, communism, and fascism. *Prereq.* 39.503 or equiv.

39.531 Business Cycles I (2 q.h.)

Intermediate macro economic theory. Theory of cyclical fluctuations in the context of multiplier and accelerator models. *Prereq.* 39.503 or equiv.

39.532 Business Cycles II (2 q.h.)

Business cycle analysis, measurement, and public policy. *Prereq.* 39.531 or equiv.

39.533 Business Cycles III (2 q.h.)

Business cycle forecasting methods and services. *Prereq.* 39.532 or equiv.

39.536 Advanced Statistics I (2 q.h.)

Advanced topics in sampling and statistical inference as a management aid. *Prereq.* 39.503, 39.513 or equiv.

39.537 Advanced Statistics II (2 q.h.)

Elements in probability theory and the decomposition of economic change into secular, seasonal, and cyclical variation. *Prereq.* 39.536 or equiv.

39.538 Advanced Statistics III (2 q.h.)

Advanced topics in statistical inference, regression, and correlation and index numbers. *Prereq.* 39.537 or equiv.

39.539 Managerial Economics (2 q.h.)

An application of the theory of demand, price, and output to the business firm and capital budgeting. *Prereq.* 39.503 or equiv.

39.540 History of Economic Thought (2 q.h.)

Development of economic theory through Keynesian and post-Keynesian analysis. *Prereq.* 39.503 or equiv.

39.551 Industrial Organization (2 q.h.)

An extension and application of micro-theory to structure and performance of American industry. Anti-trust policy and analysis. *Prereq.* 39.503 or equiv.

39.561 Urban Economics (2 q.h.)

A study of urban affairs in the context of economic principles. *Prereq.* 39.503 or equiv.

39.571 European Economic History (2 q.h.)

An analysis of European economic affairs after the industrial revolution. The twentieth century and recent integration policies and their analysis. *Prereq.* 39.503 or equiv.

39.581 Economic Policy Seminar (2 q.h.)

Capstone course for senior majors with stress upon independent study and contemporary issues. *Prereq.* 39.509, 39.531 or equiv.

40—LIBRARY SCIENCE

Consultant: Mr. R. L. Waller, Attleboro Public Library

40.501 Introduction to Library Science (2 q.h.)

Brief survey of the history of books and librarianship. The development of libraries in the United States with some emphasis on recent federal and state library legislation. The library profession, its philosophy, publications, and organizations.

40.502 Selection of Library Materials (2 q.h.)

Principles and practices in the selection of multi-media materials for the modern library; bibliographic aids to selection; practice in preparation of book notes and book reviews.

40.511 Organization of the Library (2 q.h.)

The organization, administration, and services of municipal libraries; public library systems in the United States; the role of public libraries as educational institutions.

40.512 Multi-Media Centers (2 q.h.) (Formerly Building and Administering the School Library)

Organization and management of elementary and secondary school libraries; problems in the selection and evaluation of multi-media materials necessary to the school curriculum.

40.513 Administration of Multi-Media Centers (2 q.h.) (Formerly School Library Administration)

The library as a media center for instructional materials; problems in personnel and budgeting; the library's role in the school curriculum and its services to students and faculty.

40.514 Multi-Media Materials and Services (2 q.h.) (Formerly Audio-Visual Materials and Services)

The selection, organization, and use of multi-media materials in school libraries; types of equipment and services; cataloging of non-print materials.

40.521 Introduction to Reference Materials and Methods (2 q.h.)

The basic tools and methods for locating information. Evaluation of dictionaries, encyclopedias, gazetteers and atlases, handbooks, almanacs, directories, and indexes.

40.522 Reference Work in The Social Sciences (2 q.h.)

Scope and use of outstanding reference materials in the broad range of the social sciences—economics, education, political science, sociology, and allied fields. *Prereq.* 40.521 or equiv.

40.523 Reference Work in The Humanities (2 q.h.)

Development of the book, and the beginnings of enumerative and descriptive bibliography. Approaches to the solution of reference problems in the humanities, with special emphasis on literature. *Prereq.* 40.521 or equiv.

40.524 Reference Work in Science and Technology (2 q.h.)

The significant reference materials in science and technology: physics, chemistry, engineering, mathematics, electronics, geology, biology, medicine, oceanography, and environmental sciences.

40.526 Library Community Relations (2 q.h.)

An exploration of creative approaches and practical techniques for reaching individuals and groups with dynamic library science. Emphasis on modern public relations methods and media.

40.531 Descriptive Cataloging (2 q.h.)

Theory and practice of descriptive cataloging, introducing techniques of compiling author, corporate, and serial entries.

40.532 Subject Headings and Classification (2 q.h.) (Formerly Descriptive Cataloging and Classification)

Introduction to Dewey Decimal Classification and Sears subject headings; further study of descriptive cataloging in book and non-book materials. *Prereq.* 40.531 or equiv.

40.533 Library of Congress Classification (2 q.h.)

The significant differences between LC and Dewey. Notes on original cataloging and techniques of classification within the LC scheme. Use of LC outlines and tables. *Prereq.* 40.531 or equiv.

40.541 Introduction to Children's Literature (2 q.h.)

The history of children's literature; current trends in its publication and social forces that influence its production; criteria for evaluation and aids for selection of types of children's books.

40.542 Library Service to Young People (2 q.h.)

Study of adolescent needs in the field of literature with application to both public and school libraries; special attention to the problem of material selection, book talks, and discussion groups.

40.551 Special Libraries (2 q.h.)

The purpose and development of the special library—industrial, scientific, business, and other types; the acquisition and processing of special library materials.

BUSINESS ADMINISTRATION

All course descriptions carry an indication of which quarter(s) a particular course will be offered. Any course sequence not reporting an indication will have Part I offered in the Fall, Part II in the Winter, and Part III in the Spring Quarter. Please refer to the Schedule of Courses and Registration Guide for details.

41—ACCOUNTING

Consultant: Prof. J. W. Golemme, College of Business, 437-3244.

Coordinator: C. P. Carter, Asst. Prof., College of Business, 437-3245.

41.501 Accounting Principles I (2 q.h.) (Offered every quarter)

The basic concepts and methodology of accounting for service and merchandising businesses.

41.502 Accounting Principles II (2 q.h.) (Offered every quarter)

The problems of income measurement and valuation related to sources and uses of invested capital. *Prereq.* 41.501.

41.503 Accounting Principles III (2 q.h.) (Offered every quarter)

The use of debt and investments in managerial financial decisions, followed by a brief introduction into cost decision analysis. *Prereq.* 41.502.

41.504 Intermediate Accounting I (2 q.h.)

The study of generally accepted accounting principles as applicable to the preparation of financial statements. Accounting for cash, securities, and receivables. *Prereq.* 41.503.

41.505 Intermediate Accounting II (2 q.h.)

The use of various systems for accounting for the flow of inventory in a merchandising or manufacturing operation. Long term investments as a means of providing stability to the concern. *Prereq.* 41.504.

41.506 Intermediate Accounting III (2 q.h.)

The problems of long term asset acquisition and write-off through depreciation, amortization, and depletion methods. *Prereq.* 41.505.

41.507 Cost Accounting I (2 q.h.)

The foundations of cost accounting, including terminology, purposes, and relationship to financial accounting. *Prereq.* 41.503.

41.508 Cost Accounting II (2 q.h.)

The planning and control of current operations through the use of standard costs and budgets. *Prereq.* 41.507.

41.509 Cost Accounting III (2 q.h.)

The use of cost accounting in special decisions and in long range planning. *Prereq.* 41.508.

41.510 Advanced Accounting I* (2 q.h.)

The accounting problems encountered through the issuance of capital stock, both at issue date and at subsequent dates. *Prereq.* 41.506.

41.511 Advanced Accounting II* (2 q.h.)

The techniques of statement analysis, using both internal and external information. A complete examination of cash and fund flow as it is used by the accountant and the analyst. *Prereq.* 41.510.

41.512 Advanced Accounting III* (2 q.h.)

The introduction of special problems posed by partnerships, estates, and trusts. *Prereq.* 41.511.

41.513 Specialized Problems I* (2 q.h.)

The problems of accounting for special sales. Introduction of the concepts of present value and its use in accounting. *Prereq.* 41.512.

41.514 Specialized Problems II* (2 q.h.)

The use of consolidated statements in conjunction with newly developing trends toward multi-purpose companies, combinations, mergers, and pools. *Prereq.* 41.513.

41.515 Specialized Problems III* (2 q.h.)

The use of specialized systems and financial statements by companies. *Prereq.* 41.514.

41.516 Auditing I* (2 q.h.)

The examination of modern auditing requirements relative to the professional ethics and legal responsibility of the certified public accountant and the public accountant. *Prereq.* 41.512.

41.517 Auditing II* (2 q.h.)

The methods and approach used in auditing assets of the firm. *Prereq.* 41.516.

41.518 Auditing III* (2 q.h.)

The methods and approach used in auditing liabilities, owner equity, and nominal accounts of the firm. *Prereq.* 41.517.

41.519 Federal Income Taxes I* (2 q.h.)

The application of the Federal Tax Law to the individual's income, gains, losses and expenses. *Prereq.* 41.515.

41.520 Federal Income Taxes II* (2 q.h.)

The application of the Federal Tax Law to the individual's special deductions. Installment sales; income average. *Prereq.* 41.519.

41.521 Federal Income Taxes III* (2 q.h.)

The application of Federal Tax Law to corporations. *Prereq.* 41.520.

41.522 Seminar in Contemporary Accounting Problems* (2 q.h.)

The careful examination of the underlying concepts and conventions of accounting, and their application to financial statements. *Prereq.* 41.515, and 41.509.

*Upper level Business Administration course—see page 54.

41.523 Seminar in Contemporary Accounting Problems II* (2 q.h.)

The careful examination of the areas of revenue and income recognition, cost determination and allocation, and depreciation. *Prereq.* 41.522.

41.524 Seminar in Contemporary Accounting Problems III* (2 q.h.)

The careful examination of newly developing accounting areas such as pensions, leases, stock options, and business combinations. *Prereq.* 41.523.

41.525 Estate and Gift Taxes* (2 q.h.)

An examination of the relevant Internal Revenue Code provisions, property included in gross estate, including lifetime transfers which remain subject to some control by donor; marital and charitable deductions; administrative expenses; estate planning. *Prereq.* 41.521. (Offered Fall and Spring Quarters)

41.526 Corporate and Stockholder Tax Problems I* (2 q.h.)

Real estate transactions, stock market options, transfers of appreciated assets to donees, patents, sale of franchise rights, and redemptions of stock in closely held corporations. *Prereq.* 41.525. (Offered Winter Quarter)

41.527 Corporate and Stockholder Tax Problems II* (2 q.h.)

Contribution of assets, Section 301 distributions, preferred stock, partial liquidations, spin-offs; collapsible corporations, unreasonable accumulations, personal holding companies, and elements of reorganizations. *Prereq.* 41.526. (Offered Spring Quarter)

41.528 Tax Factors in Business Decisions* (2 q.h.)

An examination of the Federal Income Tax consequences of typical business decisions: form of enterprise; compensation policy; capitalization policy; corporate reorganizations, and other related areas. *Prereq.* 41.506. (Offered Fall and Spring Quarters)

41.533 Accounting for Management Decisions I (non-accounting majors) (2 q.h.)

The preparation and interpretation of financial statements, including cash and fund flow, for internal use by the company. *Prereq.* 41.503.

41.534 Accounting for Management Decisions II (non-accounting majors) (2 q.h.)

The preparation and interpretation of cost accounting information. *Prereq.* 41.533.

41.535 Accounting for Management Decisions III (non-accounting majors) (2 q.h.)

The utilization of accounting information for management decisions. *Prereq.* 41.534.

41.541 Accounting Principles (Intensive) (6 q.h.)

Basic concepts and methodology of accounting for service and merchandising businesses. The problems of income measurement and valuation related to sources and uses of invested capital. The use of debt and investments in managerial financial decisions, followed by a brief introduction into cost decision analysis. *Not open to students who have taken 41.501, 41.502, 41.503.* (Offered every quarter)

*Upper level Business Administration course—see page 54.

41.542 Intermediate Accounting (Intensive) (6 q.h.)

The study of generally accepted accounting principles as applicable to the preparation of financial statements. Accounting for cash, securities, and receivables. The use of various systems for accounting for the flow of inventory in a merchandising or manufacturing operation. Long term investments as a means of providing stability to the concern. The problem of long term asset acquisition of and write-off through depreciation, amortization, and depletion methods. *Not open to students who have taken 41.504, 41.505, 41.506.* *Prereq. 41.503.* (Offered Summer Quarter)

41.543 Accounting for Management Decisions (Intensive) (non-accounting majors) (6 q.h.)

The preparation and interpretation of financial statements, including cash and fund flow, for internal use by the company. The preparation and interpretation of cost accounting information and the utilization of accounting information for management decisions. *Not open to students who have taken 41.533, 41.534, 41.535.* *Prereq. 41.503.* (Offered Summer Quarter)

41.551, 41.552 Accounting (A), (B) (6 q.h.)

The basic concepts and methodology of accounting for service and merchandising businesses. The problems of income measurement and valuation related to sources and uses of invested capital. The use of debt and investments in managerial financial decisions, followed by a brief introduction into cost decision analysis. (Offered Fall and Winter Quarters)

43—MARKETING

Consultant: Prof. C. H. Dufton, Chairman, Marketing Department
College of Business Administration 437-3260

Coordinator: G. P. Foster, 749-1599

43.501 Introduction to Marketing I (2 q.h.)

A description and evaluation of the marketing system and an introduction to the decision-making process. (Offered every quarter)

43.502 Introduction to Marketing II (2 q.h.)

A continuation of Marketing I with emphasis upon specific marketing functions and their application through the use of case studies and analysis. *Prereq. 43.501.* (Offered every quarter)

43.503 Introduction to Marketing III (2 q.h.)

A continuation of the case method plus discussion and analysis of current marketing issues and problems. *Prereq. 43.502.* (Offered every quarter)

43.504 Introduction to Marketing (Intensive) (6 q.h.)

A description and evaluation of the marketing system and an introduction to the decision-making process, with emphasis upon specific marketing functions and their application through the use of case studies and analysis. A continuation of the case method plus discussion and analysis of current marketing issues and problems. *Not open to students who have taken 43.501, 43.502, 43.503.* (Offered every quarter)

43.505, 43.506 Introduction to Marketing (A), (B) (6 q.h.)

A description and evaluation of the marketing system and an introduction to the decision-making process. A review of specific marketing functions and their application through the use of case studies and analysis. A continuation of the case method plus discussion and analysis of current marketing issues and problems. (Offered Fall and Winter Quarters)

43.507 Sales Management I (2 q.h.)

Through readings and case studies, the creation, management, and appraisal of the sales force are examined. In the first quarter of the course, emphasis is upon the principles, policies and structures of sales organization and the selection of salesmen. *Prereq.* 43.503.

43.508 Sales Management II (2 q.h.)

A continuation of 43.507 with emphasis upon sales force operation, including communication, sales training, compensation, expenses, supervision, morale, and stimulation. *Prereq.* 43.507.

43.509 Sales Management III (2 q.h.)

In this concluding quarter of the course, emphasis is upon *sales planning*: market potential, sales forecast, sales budgets, territories, quotas; *sales analysis*: sales volume, marketing cost, performance; and the sales manager. *Prereq.* 43.508.

43.511 Creative Marketing Communications I (2 q.h.)

The principles of advertising and sales promotion and how they are used with maximum efficiency as communications and motivational functions of the marketing mix. *Prereq.* 43.503.

43.512 Creative Marketing Communications II (2 q.h.)

A study of specific advertising and sales promotion techniques in various media, with emphasis on the development of creative concepts as an important part of sales and marketing strategy. *Prereq.* 43.511.

43.513 Creative Marketing Communications III (2 q.h.)

Case histories and contemporary projects are used for improving ability to develop creative advertising and sales promotion strategies in support of overall sales and marketing goals. *Prereq.* 43.512.

43.514 Marketing Fundamentals I (Industrial Technology majors only.) (2 q.h.)

A description of the role of marketing in the modern business firm and an introduction to basic marketing strategies. (Offered Fall and Winter Quarters)

43.515 Marketing Fundamentals II (Industrial Technology majors only.) (2 q.h.)

A continuation of Marketing Fundamentals I with emphasis upon specific marketing functions and the evaluation and control of the marketing effort. (Offered Winter and Spring Quarters)

43.518 Retailing and Mass Merchandising I (2 q.h.)

The marketing concept and retail management, retail profit and loss. Starting a retail business, store location, store planning, and the retail organization.

43.519 Retailing and Mass Merchandising II (2 q.h.)

Merchandising planning and control, pricing, and buying. *Prereq.* 43.518.

43.522 Retailing and Mass Merchandising III (2 q.h.)

Distribution of merchandise, sales promotion, customers' services, retail accounting, and expense management. *Prereq.* 43.519.

43.520 Industrial Marketing (2 q.h.)

The marketing of products where other business firms and organizations are the customers, including a study of physical distribution, marketing concepts, and the decision-making process relevant to the marketing of business goods. *Prereq.* 43.503. (Offered Fall Quarter)

43.525 Marketing Research I* (2 q.h.)

Introductory presentation and evaluation of procedures and techniques currently available to improve the chances of marketing success and effectiveness. *Prereq.* 43.503, 39.513, 45.572. (Offered Fall Quarter)

43.526 Marketing Research II* (2 q.h.)

Modern techniques of data collection and analysis, both quantitative and qualitative, in marketing research, forecasting, product planning, test marketing, marketing evaluation, and the application of modern data-processing techniques. *Prereq.* 43.525. (Offered Winter Quarter)

43.529 International Marketing (2 q.h.)

Opportunities, methods, and policies required for the successful development and management of international business and marketing operation. *Prereq.* 43.503. (Offered Winter Quarter)

43.530 Consumer Behavior Seminar (2 q.h.)

Economic, behavioral, and other models of consumer behavior are examined as bases for the planning and evaluation of marketing effort. *Prereq.* 43.503. (Offered Spring Quarter)

43.532 Marketing Management I* (2 q.h.)

Advanced management and decision-making covering the complete marketing spectrum are analyzed in a variety of case studies and problems. *Prereq.* 43.503.

43.533 Marketing Management II* (2 q.h.)

Using a seminar-type approach, emphasis is placed upon problem-solving in such areas as sales, logistics and physical distribution, advertising, pricing, new development, public and governmental policy. *Prereq.* 43.532.

43.534 Marketing Management III* (2 q.h.)

A continuation of Marketing Management II, with increased emphasis upon case analysis and study. *Prereq.* 43.533.

43.536 Introduction to Advertising (2 q.h.)

A broad survey of advertising and how it contributes to business activity, and to our society and culture, with emphasis on the principles involved in its increasing importance as a major form of communications and motivation. (Offered Spring Quarter)

*Upper level Business Administration course—see page 54.

43.537 Marketing and Sales Seminar* (2 q.h.)

A one-quarter, cap-stone course to round out the student's study of marketing through investigation and analysis of the most recent trends in marketing management, finance, logistics, sales, advertising, and promotion. *Prereq.* 43.534. (Offered Spring Quarter)

43.541 Public Relations I (2 q.h.)

Introduction to the basic principles, purposes, and methods of public relations. *Prereq.* 43.503. (Offered Fall Quarter)

43.542 Public Relations II (2 q.h.)

A continuation of Public Relations I providing in-depth coverage of the planning, management, operation, and evaluation of public relations programs, including case analysis. *Prereq.* 43.541. (Offered Winter Quarter)

43.543 Salesmanship I (2 q.h.)

Opportunities in personal selling for both men and women; the importance in the marketing mix; introduction to broadly applicable principles for all types of selling. *Prereq.* 43.503. (Offered Fall Quarter)

43.544 Salesmanship II (2 q.h.)

Development of techniques as required for the personal selling of goods and services through middlemen and direct to the consumer. Both industrial and consumer channels are studied. *Prereq.* 43.543. (Offered Winter Quarter)

44—FINANCE AND INSURANCE

Finance

Consultant: Prof. R. J. Hehre, College of Business 437-3248

Coordinator: W. F. Hancock, Jr. 359-4281

44.501 Finance and Risk Management I (2 q.h.)

A survey of major financial institutions and their role within the economy. Special emphasis is given to the dollar supply, commercial banking, the Federal Reserve System, and savings institutions. *Prereq.* 41.503. (Offered every quarter)

44.502 Finance and Risk Management II (2 q.h.)

A study of security markets and investment institutions. The student is introduced to stocks, bonds, investment companies, and trust companies. (Offered every quarter)

44.503 Finance and Risk Management III (2 q.h.)

This course is intended to acquaint each student with personal, property, and liability risks, and the forms of insurance designed to meet these risks. The emphasis is placed on basic insurance principles inherent in life, homeowners, and automobile coverage. (Offered every quarter)

*Upper level Business Administration course—see page 54.

44.504 Principles of Finance, Investment, Insurance and Risk Management (Intensive) (6 q.h.)

Same as 44.501, 44.502 and 44.503. *Not open to students who have taken those courses. (Offered Winter, Spring and Summer Quarters)*

44.505 Corporate Finance (Intensive) (6 q.h.)

An introduction to the role of financial management of the business firm. Review of financial statements, promotion, and forms of organization. Planning the use of assets and cost of capital concepts are introduced as management evaluation techniques. An analytical approach to capital budgeting and optimum asset returns. Cost of capital is further developed and applied against consideration of capital mixture. *Not open to students who have taken 44.507, 44.508, 44.509. Prereq. 44.501. (Offered Winter and Summer Quarters)*

44.507 Corporate Finance I (2 q.h.)

An introduction to the role of financial management of the business firm. Review of financial statements promotion, and forms of organization. Planning the use of assets and cost of capital concepts are introduced as management evaluation techniques. *Prereq. 41.503, 44.501.*

44.508 Corporate Finance II (2 q.h.)

An analytical approach to capital budgeting and optimum asset returns. Cost of capital is further developed and applied against consideration of capital mixture. *Prereq. 44.507.*

44.509 Corporate Finance III (2 q.h.)

The analysis of various financial tools are considered. An intensive examination of short and intermediate term credit, as well as the distribution of stocks and bonds to the public and special buyers. A survey of reorganization and liquidation techniques are analyzed. *Prereq. 44.508.*

44.517 Investments I* (2 q.h.)

Investment goals and objectives are considered. Various types of investments are compared and the role of the securities markets examined. *Prereq. 44.509.*

44.518 Investments II* (2 q.h.)

Broad coverage of the relationship between the economy and stock price averages. Methods of analyzing and appraising developments within the corporation as they apply to the investment analyst's techniques. *Prereq. 44.517.*

44.519 Investments III* (2 q.h.)

The relation of earnings, dividends, and cash flow to market valuation of a company's securities. Portfolio analysis and planning are examined, as well as methods of security selection. Technical and fundamental factors are also considered. *Prereq. 44.518.*

44.521 Credit Management I* (2 q.h.)

An introduction to credit and its functions, including the role of the credit executive, credit investigation, documentary credit, trade credit. *Prereq. 44.509.*

*Upper level Business Administration course—see page 54.

44.522 Credit Management II* (2 q.h.)

The organization and function of credit departments; various forms of credit and collection services. *Prereq.* 44.521.

44.523 Credit Management III* (2 q.h.)

Analysis of financial statements to determine credit worthiness, creditor's rights, adjustment bureau, credit insurance, and guarantees. *Prereq.* 44.522.

44.531, 44.532 Seminar in Finance I, II* (4 q.h.)

Student participation in the study and analysis of case histories. Individual papers presented. *Prereq.* All finance courses. (Offered Fall and Winter Quarters)

44.533 International Finance I (2 q.h.)

Introduction to international financial management in the multi-national corporation. Analysis of the basic problems and finance considerations involved with international investments, trade, and payments. Planning in the international environment related to exchange rates, currency revaluations, inflation, and local government policies. *Prereq.* 44.507 or consent of instructor. (Offered Fall Quarter)

44.534 International Finance II (2 q.h.)

Analysis of the financial strategy involved with international investment alternatives, sources of capital, working capital management, fund flows, and management control through accounting and financial reporting. *Prereq.* 44.533. (Offered Winter Quarter)

44.535 Investments (Intensive) (6 q.h.)

Investment goals and objectives are considered. Various types of investments are compared and the role of the securities markets examined. Broad coverage of the relationship between the economy and stock price averages. Methods of analyzing and appraising developments within the corporation as they apply to the investment analyst's techniques. The relation of earnings, dividends, and cash flow to market valuation of a company's securities. Portfolio analysis and planning are examined, as well as methods of security selection. Technical and fundamental factors are also considered. *Not open to students who have taken 44.517, 44.518, 44.519.* *Prereq.* 44.509. (Offered Spring and Summer Quarters)

44.544 Law of Finance* (2 q.h.)

A consideration of the legal problems immediately affecting finance. Special attention is given to the field of corporate law. *Prereq.* 44.509, 45.543. (Offered Spring Quarter)

44.545 Profit Planning and Control I* (2 q.h.)

An intensive treatment of managerial planning, budgetary control, and financial analysis. Emphasis is placed on the interrelationship between functional areas in an organization using consolidated profit planning as an integrating device.

*Upper level Business Administration course—see page 54.

Students will utilize materials studied in earlier courses. Topics covered include fundamental financial analysis, comprehensive profit planning and control, general expense planning and control, production planning, materials planning and control, purchasing direct, etc. *Prereq.* 41.506, 44.509 or equiv. (Offered Fall Quarter)

44.546 Profit Planning and Control II* (2 q.h.)

Topics covered include development and application of variable budgets, planning and controlling capital expenditures, computer applications in profit planning, cash flow planning and control, cost-profit-volume analysis, performance reporting and analysis of budget variations. *Prereq.* 44.545. (Offered Winter Quarter)

44.547 Advanced Financial Problems* (2 q.h.)

An in-depth examination of two complex but vital financial areas. Failure and re-organization, and merger and consolidation. Students will devote considerable time to studying the legal relationships and requirements of both areas as their business implications. *Prereq.* 44.509 or equiv. (Offered Spring Quarter)

44.548 Capital Strategy (2 q.h.)

Focuses on the matters of capital budgeting and the related capital structure problems with particular emphasis on the role of the cost of capital in long range decision-making. The processes by which investment decisions and financing decisions are made, as well as sources of long-term funds are examined. (Offered every quarter)

Insurance

Coordinator: Mr. C. W. Earnshaw 437-2506

44.511 Life Insurance I (2 q.h.)

A study of the origin, development, and basis of modern life insurance. Analysis and comparison of the various policies and riders and their uses. (Offered Fall Quarter)

44.512 Life Insurance II (2 q.h.)

The fundamentals of programming, including beneficiary designations, settlement options, and tax implications. Company organization and operations: underwriting, investments, and regulations. (Offered Winter Quarter)

44.513 Estate Planning and Business Insurance (2 q.h.)

The use of insurance to meet the needs of the various types of business organizations. The planning, disposition, administration, and taxation of testamentary and intervivos transfers of property. (Offered Spring Quarter)

44.514 Property & Casualty Insurance I (2 q.h.)

The basis of modern property-casualty insurance. Analysis of the insurance contract, its application, meaning, and rating.

*Upper level Business Administration course—see page 54.

44.515 Property & Casualty Insurance II (2 q.h.)

Study of various policies including automobile, homeowners, inland marine, and commercial special multi-peril. *Prereq.* 44.514.

44.516 Property & Casualty Insurance III (2 q.h.)

A study of the mechanics of the insurance industry, including types of companies, reserves, reinsurance, financial analysis, and government regulation. *Prereq.* 44.515.

44.525 Health and Social Insurance I* (2 q.h.)

A study of the economic basis served by health and social programs of insurance, including a detailed analysis and comparison of the plans offered. (Offered Fall Quarter)

44.526 Health and Social Insurance II* (2 q.h.)

A continuing study of contracts, including benefit structure, rate-making, reserves and the proper use and coordination of the plans available from private industry and from the government. *Prereq.* 44.525. (Offered Winter Quarter)

44.527 Group Insurance and Pensions (2 q.h.)

The nature, development, and coverage offered by group life and health insurance. Analysis of the various kinds of individual and group pension plans and their use. (Offered Spring Quarter)

44.529 Advanced Property Insurance* (2 q.h.)

A study of the plans and programs designed to provide protection for multi-peril, diversified industrial, and commercial organizations. *Prereq.* 44.515. (Offered in Fall Quarter, 1975-1976)

44.530 Advanced Property-Casualty Insurance* (2 q.h.)

A study of the various plans and programs for providing liability and casualty protection for commercial and industrial organizations. *Prereq.* 44.515. (Offered Winter Quarter, 1975-1976)

44.543 Law of Insurance* (2 q.h.)

A study of the legal problems affecting insurance, including regulation design and interpretation of contracts and the relationship between the insurance company, its agent, and the public. *Prereq.* 45.543. (Offered Spring Quarter, 1975-1976)

45—MANAGEMENT

General Management

Consultant: Prof. D. McCarthy, College of Business 437-3256

Coordinator: J. L. Griffith 848-0835

Coordinator: W. A. Gagne 495-5455

45.501, 45.502, 45.503 Management and Organization I, II, III (6 q.h.)

An introduction to the American business system; comparison with other economic systems; principles and concepts of organization and management. Emphasis on topics such as the social responsibilities of business; business

*Upper level Business Administration course—see page 54.

and its environment; business ethics, etc. Traditional material presented toward an understanding of modern American business and preparation for a business career. The environment within which business operates; a review of the theory and practice of organization; the "what" and "how" of the management process; an application of the concepts covered to the functional areas of business. *Prereq.* 45.502, 45.503. (Offered every quarter) (Available on suburban campuses)

45.652 Management and Organization (Intensive) (6 q.h.)

Same as 45.501, 45.502, 45.503. Not open to students who have completed those courses. (Offered every quarter) (Available on suburban campuses)

45.523, 524, 525 Management Seminar I, II, III* (6 q.h.)

A broad interdisciplinary project utilizing one or more of the techniques of library research, field research, field surveys and organizational audits. Students will be expected to utilize the knowledge gained in earlier course work. *Prereq.* 45.535.

45.533, 534, 535 Management Decisions & Policies I, II, III (6 q.h.)

Takes the viewpoint of the general manager in planning effective relationships between the organization and its environment. Emphasis placed on sensing, analyzing, evaluating, and responding to demographic, cultural, political and technological change. Functions and responsibilities of top management; problems which affect the character and success of the total enterprise; operations in various environments and the impact of government regulations. A framework will be developed for dealing with a total organization evolving or modifying strategies and policy. Cases are drawn from profit oriented and non-profit entities of various sizes in widely diversified fields, operating in a variety of environments. Students will be expected to actively participate in class discussions of case studies. *Prereq.* minimum of 100 quarter hours of completed course work.

45.600, 45.601, 45.602 Small Business Management I, II, III (6 q.h.)

For those who wish to explore the opportunities of being in a small business or in business for themselves. Subjects considered include objective self-analysis; discovery of opportunities in the manufacturing, retailing and service fields; raising and conservation of capital; organization and site location factors; management controls in relation to legal, financial, personnel, and marketing problems.

45.603 Administrative Management & Office Services I (2 q.h.)

Principles and techniques of modern administrative management including organization, planning, office mechanization, computers, information requirements analysis, and the conducting of a systems study. (Offered Fall Quarter)

45.604 Administrative Management & Office Services II (2 q.h.)

An analysis of systems and procedures, business writing, report structuring, records management, control techniques, staffing, and methods of directing the administrative management function. *Prereq.* 45.504. (Offered Winter Quarter)

*Upper level Business Administration course—see page 54.

45.606 Management Decisions & Policies (Intensive)* (6 q.h.)

Same as 45.533, 45.534, 45.535, except presented twice per week during a single quarter. *Prereq. Minimum of 100 Quarter Hours of completed course work.* (Offered Summer Quarter)

45.646 Management Seminar (Intensive)* (6 q.h.)

Same as 45.523, 45.524, 45.525, except presented as a single quarter intensive course. Not open to students who have taken 45.523, 524, 525. *Prereq. 45.535.*

45.667 Project Planning and Control (2 q.h.)

This course employs a systems approach to planning and controlling a work project. Topics to be covered include detailed planning techniques, establishment of functional and individual responsibilities, resource allocation, identifying anticipated benefits, measuring results and effective progress reporting. Students will be expected to actively participate in class workshop sessions. *Prereq. Minimum of 40 quarter hours of completed work.* (Offered every quarter)

45.670 The Management of Change I (2 q.h.)

The firm as perceived in current terms is explored. Selected readings of significant dynamic management theorists are studied. Evaluation of business performance as related to dynamic company objectives; recognition of need for change; the exploration, development, and synthesis of the conceptual and practical implications of change dynamics; the dimensions of change—rate and direction—will be established; change as a management objective. *Prereq. 45.503.*

45.671 The Management of Change II (2 q.h.)

The transitional organization and the process of organizational change are studied; implications of technological advances on company operations; the firm and/or environment as causative change agents; establishment of planned, profit-oriented change strategies; the transitional manager innovative principles of administration and organization; the resistance to change; measurement and control of change dimensions. Case studies on the social, economic and political forces shaping society. *Prereq. 45.670.*

45.672 The Management of Change III (2 q.h.)

Conceptual approaches applied to the emerging organization are considered: administrative and organizational flexibility, strategy/structure synergism; integration of profit and social responsibility; industrial productivity and leisure time; interrelationship among economic, technological, social and political change and their impact on the firm; the systems manager; the development of a model for change. *Prereq. 45.672.*

45.696 Principles and Practice of Management (2 q.h.)

Considers management as a process engaged in various levels of any organization, and investigates fundamental principles which are generally accepted as the foundation of management action. Included among other topics are those of planning, organizational considerations, and directing and controlling an organization. Application of generally accepted principles are considered through investigation of management practice in organizational settings. (Offered every quarter)

*Upper level Business Administration course—see page 54.

49.504 Strategy for Planning I (3 q.h.)

Students participate as team members in a computerized decision-making exercise. Course materials, class discussions and guest lecturers will expose the student to planning techniques, systems, and issues with which executive management becomes involved. Each class member is provided with an opportunity to use a full range of skills and experience to make key decisions in planning and operating a company in an uncertain, competitive environment. *Prereq. Minimum of 100 quarter hours of completed work. 45.535 recommended.* (Offered Fall and Winter Quarters)

49.505 Strategy for Planning II (3 q.h.)

A continuation of 49.504. Students will have continued opportunities to analyze results of previous decision-making, engage in additional planning and decision-making, and conduct board meetings. *Prereq. 49.504.* (Offered Winter and Spring Quarters)

Industrial Management Courses

Consultant: J. M. Rosenfeld 969-4783

45.506 Production Management & Manufacturing Systems I (2 q.h.)

Analysis of the basic areas of production management, characteristic organizations, activities, responsibilities and decision making. The systems concept as applied to manufacturing. Manufacturing costs and their management.

45.507 Production Management & Manufacturing Systems II (2 q.h.)

Further analysis of the manufacturing system, including production control, materials, work design, simplification and measurement; quality control; data processing as applied to manufacturing; selected readings in modern production management techniques. *Prereq. 45.506.*

45.508 Production Management & Manufacturing Systems III (2 q.h.)

Continuing study and analysis of the manufacturing function; production and process technology; work place methods and standards; planning and control of operations and inventories: concepts, analytical techniques and information systems; selected case studies emphasizing relevant production management and manufacturing systems, concepts and applications. *Prereq. 45.507.*

45.519 Work Methods (2 q.h.)

The principles of motion economy and work simplification in analysis and improvement of methods, utilizing flow charts, diagrams, work station activity charts, and laboratory techniques. (Offered Fall Quarter)

45.526 Facilities Planning & Design I (2 q.h.)

The planning and designing of industrial plants, in terms of equipment and machinery requirements, plant layout and material flow, utilizing flow charting, scheduling, and laboratory scale models. *Prereq. 45.508.* (Offered Fall Quarter)

45.531 Facilities Planning & Design II (2 q.h.)

The fundamentals of material handling and related equipments, vehicles, and machinery, including cranes, conveyors, freight elevators, and monorails, with emphasis on analysis of problems, typical cases, and costs, and including engineering economy. *Prereq. 45.526.* (Offered Winter Quarter)

45.528 Work Measurement (2 q.h.)

Measurement techniques as applied to development of production and wage standard data, including appropriate incentive plans and directed towards quantity manufacturing, with laboratory use. (Offered Winter Quarter)

45.530 Standard Data Development (2 q.h.)

Development of production standards for job shop operations, applying curve, table, equation, nomograph, family and multivariables techniques, and utilizing work sampling methods and laboratory practice. (Offered Spring Quarter)

45.595 Manufacturing Seminar I* (2 q.h.)

Problems of manufacturing operation at the plant manager level, including production economics of specialization, simplification, standardization, diversification, expansion, contraction, or integration, all with pertinent, selected case studies. *Prereq.* 45.625 & 45.637.

45.596 Manufacturing Seminar II* (2 q.h.)

Continued analysis of manufacturing problems, including plant location, layout, materials handling, power maintenance, labor market status, organization and wage policy, all with pertinent, selected case studies. *Prereq.* 45.595

45.597 Manufacturing Seminar III* (2 q.h.)

Continued analysis of manufacturing problems, including controls of the manufacturing process; product design and development, scheduling, inventory, quality, cost and budgetary controls with applicable cases. *Prereq.* 45.596.

45.620 Industrial Safety (2 q.h.)

A study of the organization and administration of a comprehensive accident-prevention program, including analysis of industrial hazards and accidents, corrective actions, and the responsibilities of all management echelons, from the safety engineer to top management. (Offered Fall and Spring Quarters)

45.623 Manufacturing Processes I—Material (2 q.h.)

Materials and their processing, including the derivation, characteristics, and applications of materials used in industry, such as ferrous, non-ferrous metals, plastics, their mechanical, thermal, electrical, chemical, and other properties with an analysis of applications to manufacturing.

45.624 Manufacturing Processes II—Production (2 q.h.)

Machinery, welding and allied processing, including an analysis of product design. Production processes and material selection in the production and manufacturing of hard goods, including selection of best methods by study of casting, machinery, forming, joining, hot and cold locking, extrusion, finishing, and assembly. *Prereq.* 45.623.

45.625 Manufacturing Processes III—Automation (2 q.h.)

The analysis of advanced manufacturing processes, including mass production, numeric control, central vs line layout systems, automated systems and related problems, computer controlled equipments and systems, equipment and machinery selection and replacement policies. Emphasis on manufacturing processes case studies. *Prereq.* 45.624.

*Upper level Business Administration course—see page 54.

45.627, 45.628 Value Management I, II (4 q.h.)

An organized technique for challenging costs by analyzing a product or method in terms of value, function, and costs, without sacrificing essential quality. (Offered Fall and Winter Quarters)

45.636 Production & Inventory Control I (2 q.h.)

Basic analysis and systems design techniques for controlling production. Aspects of intermittent and continuous production scheduling and the relationship of planning, scheduling and dispatching, and utilizing mathematical models. Scheduling techniques of PERT, CPM, line of balance and learning curves. Field trip to local company and examination of its production control system. (Offered Fall and Winter Quarters)

45.637 Production & Inventory Control II (2 q.h.)

Analysis and systems design techniques for controlling inventory levels emphasizing cost reduction, including inventory investment, economic order quantity, make or buy decisions, and warehousing. Goals include bringing the range of concept and technique to the point of useful application in practical design. *Prereq.* 45.636. (Offered Winter and Spring Quarters)

45.638 Industrial Decision Making I* (2 q.h.)

The development of a systematic approach to problem solving and decision making; decision theory; structure of human decisions. *Prereq.* 10.334.

45.639 Industrial Decision Making II* (2 q.h.)

Application of mathematical methods of management science and quantitative decision-making procedures to practical industrial problems; optimization and models applied to production functions such as the inventory process, plant location, layout and maintenance, and equipment selection, replacement, and maintenance. *Prereq.* 45.638.

45.640 Industrial Decision Making III* (2 q.h.)

Application of mathematical methods of management science and quantitative decision-making procedures to practical industrial problems, including linear systems utilizations and functional production applications such as: economic lot size, optimal machine loading, production, and employment scheduling; seasonal inventory distribution; transportation and transshipment models; maximum profit margin; methods improvements; selected case studies. *Prereq.* 45.639.

45.642 Production Management & Manufacturing Systems (Intensive) (6 q.h.)

Same as 45.506, 45.507, 45.508. Not open to students who have completed those courses. (Offered Fall, Spring, and Summer Quarters)

45.673 Industrial Processes I (2 q.h.)

Familiarizes the Industrial Technology student with the materials and processes used in manufacturing to convert ideas into products, machines and structures; characteristics and applications of materials used in industry; casting and forming processes; machining processes. Open to Industrial Technology students only. (Offered every quarter)

*Upper level Business Administration course—see page 54.

45.674 Industrial Processes II (2 q.h.)

Continued analysis of manufacturing processes including welding and allied processes; machine tools: advantages and limitations; economic analysis of manufacturing processes; automated and computer controlled systems; equipment and machinery selection and replacement policies. *Prereq.* 45.678. (Offered every quarter)

45.688 Production and Inventory Control (Intensive) (4 q.h.)

Same as 45.636, 45.637. Not open to students who have completed those courses. (Offered Fall, Spring, and Summer Quarters)

45.695 Materials Management (2 q.h.)

The development and examination of materials management objectives as they relate to cost improvement, investment control, and ability to serve the market; the development of an integrated market, the development of an integrated materials system; cases in materials management. (Offered every quarter)

49.501 Environmental Management I (2 q.h.)

The state of our environment now and in the future—an introduction to the types and threats of pollution, including the atmosphere, land, and waterways. Emphasis placed on impact of pollution upon economic growth, business profitability, governmental outlays and individual expenditures. Lectures, class participation, and selected readings. Written reports required.

49.502 Environmental Management II (2 q.h.)

A continuation of Environmental Pollution I in which the level of our technology is explored. A review of control techniques, disposal systems and purification equipment with an evaluation of their effectiveness and costs. Critical unsolved technical problems and the needs for scientific investigation will be highlighted. Lectures, class participation, and selected readings. Written reports required. *Prereq.* 49.501.

49.503 Environmental Management III (2 q.h.)

A continuation of Environmental Pollution II in which past, present and future controlling and corrective actions of business and government and the individual are examined. Evaluation of the balance between responsible self control and preventive legislation. Specific attention to the complexity of interacting factors and the dilemma of productivity demands versus the environmental limitations of adaptability. Lectures, class participation, and selected readings. Written reports required. *Prereq.* 49.502.

Purchasing

Coordinator: Mr. A. D. Finley 475-6172

45.537 Purchasing I (2 q.h.)

The fundamental mission and span of responsibility of industrial purchasing in business: the procurement cycle, its principles, methods, and vocabulary.

45.538 Purchasing II (2 q.h.)

Techniques of organization of the purchasing function: its systems, source selection and evaluation; the legal environment; quantity and quality determination. *Prereq.* 45.537.

45.539 Purchasing III (2 q.h.)

Techniques of creative buying: types of contracts; negotiating and price/cost analysis; purchasing ethics; supplier monitoring and expediting; contract modification and termination. - *Prereq.* 45.538.

45.626 Professional Purchasing Techniques* (2 q.h.)

A seminar-type examination of methods of negotiation, use of contract types and incentives which yield improved buyer performance. Price analysis and the development of supplier monitoring and control techniques. *Prereq.* 45.539. (Offered Spring Quarter)

45.666 The Materials Acquisition Function (2 q.h.)

A survey of the procurement function as found in industry. This course is designed to furnish candidates, with majors in other than purchasing, a broad comprehension of the acquisition function. Purchasing's mission, procedures, proper interface with other functions, and its legitimate objectives are explored. System techniques, organizational structures and required skills are investigated and particular attention is given to the integration of this function into the total cycle of product creation. (Offered Fall and Spring Quarters)

Personnel & Industrial Relations

Coordinator: (Industrial Relations) Mr. D. F. Hurley 785-0484

45.517 Techniques of Employee Selection* (2 q.h.)

Recruitment, selection, and placement techniques including interviewing, employment testing, and examining. *Prereq.* 45.515. (Offered in Spring Quarter)

45.518 Wage and Salary Administration* (2 q.h.)

Wage and salary determination; merit and incentive plans; wage and salary structure; compensation methods; impact on employer-employee relations in the economy. *Prereq.* 39.503, 45.503. (Offered in Fall Quarter)

45.521 Employee Benefits* (2 q.h.)

Private and public programs directed to job and worker income security; unemployment compensation, training and employment services; private guaranteed income; retirement pension plans and disability; group insurance. *Prereq.* 39.503. (Offered in Winter Quarter)

45.522 Job Evaluation (2 q.h.)

Wage-payment systems; theory of wage determination, job elements, rating scales, writing job descriptions and specifications; selection of plans; development of wage structures and integration with the principles of merit rating. (Offered Fall Quarter)

45.545 Law Employment Standards* (2 q.h.)

The minimum wage laws—state and federal—and laws on employment practices, administrative and enforcement procedures, employment provisions of the 1964 Civil Rights Act, and of state anti-discrimination laws. *Prereq.* 45.611. (Offered in Fall Quarter)

*Upper level Business Administration course—see page 54.

45.546 Law of Employment Conditions* (2 q.h.)

The Labor Management Reporting and Disclosure Act, the Social Security Act, The Massachusetts Employment Security Act. The Massachusetts Workmen's Compensation Act, veterans' reemployment rights. *Prereq.* 45.611. (Offered in Winter Quarter)

45.548 Law of Labor Management Relations* (2 q.h.)

The legal framework for collective bargaining, the impact of the anti-trust laws on labor unions, injunctions in labor disputes, the Railway Labor Act, the National Labor Relations Act, the Labor-Management Relations Act. *Prereq.* 45.611. (Offered in Spring Quarter)

45.553 The Labor Agreement* (2 q.h.)

Labor contracts: component clauses, grievance analysis, and arbitration procedures. Case studies in labor-management relations affected by such clauses. *Prereq.* 45.611 (Offered Fall Quarter) (Available on suburban campuses 1974–1975)

45.556 Negotiations, Mediation, Arbitration* (2 q.h.)

The bargaining process; preparation and negotiation of agreements; mediation, fact-finding, arbitration, other alternatives to the strike. *Prereq.* 45.611. (Offered Winter Quarter) (Available on suburban campuses 1974–1975)

45.557 International Labor Movements* (2 q.h.)

Historical treatment of American labor union development and theories of labor organization; relation of labor and government, American, European, and Latin-American labor organization and institutions; international labor organizations. *Prereq.* 45.611 (Offered in Fall Quarter 1975–1976)

45.560 Seminar on Labor Issues* (2 q.h.) (For Seniors Only)

An advanced discussion of current labor-management issues; policy as to disputes, wage guidelines, public employees' unions, professionals, etc. *Prereq.* 45.546, 45.548, 45.553. (Offered Spring Quarter) (Available on suburban campuses 1974–1975)

45.610 Labor Management Relations I (2 q.h.)

The American labor movement and labor relations development; collective bargaining issues, policy and practice; public control of industrial relations. *Prereq.* 39.503. (Offered every quarter)

45.611 Labor Management Relations II (2 q.h.)

Continuation of I. The economic and political impact of bargaining power on labor markets, employment, wages, and income. *Prereq.* 45.610. (Offered every quarter)

45.690 Labor Management Relations (Intensive) (4 q.h.)

The American labor movement and labor relations development; collective bargaining issues, policy, and practice; public control of industrial relations. The economic and political impact of bargaining power on labor markets, employment, wages, and income. *Prereq.* 39.503. *Not open to students who have taken 45.610, 45.611.* (Offered Fall, Spring, and Summer Quarters) (Available on suburban campuses in Spring Quarter)

*Upper level Business Administration course—see page 54.

Personnel

45.511 Human Relations in Organizations I (2 q.h.)

An introduction to human problems of the work environment: motivation, employee participation; formal and informal organizations; and leadership patterns. (Offered every quarter)

45.512 Human Relations in Organizations II (2 q.h.)

A continuation of Human Relations I; the processes of communication, interviewing, counseling, appraisal of performance, and the accomplishment of change. Special employment groups and overview of the individual in his organization. *Prereq.* 45.511. (Offered every quarter)

45.513 Personnel Management I (2 q.h.)

Organization, function, and procedures of the personnel department in relationship to the management organization; manpower selection; training; rating; personnel policies, benefits, and reports.

45.514 Personnel Management II (2 q.h.)

Principles and techniques of training, the psychology of learning, meeting training needs, principles and practices of organizing training activities. *Prereq.* 45.513.

45.515 Personnel Management III (2 q.h.)

Controlling and coordinating the managerial responsibility of supervision; planning the work; employee assignments; employees attitudes; employee grievances; administering company policies, developing work interest. *Prereq.* 45.514.

45.552 Advanced Human Relations (2 q.h.)

A seminar to discuss the theories of human effectiveness. An amplification of topics surveyed in Human Relations I, II, emphasizing their practical application to present-day management of business enterprises. Review implications of such theories as the managerial grid, theory X, Y, maintenance vs motivation, etc. *Prereq.* 45.512. (Offered every quarter)

45.607 Personnel Management (Intensive) (6 q.h.)

Organization, function, and procedures of the personnel department in relationship to the management organization; manpower selection; training; rating; personnel policies, benefits, and reports. Principles and techniques of training; the psychology of learning; meeting training needs; principles and practices; organizing training activities. Controlling and coordinating the managerial responsibility of supervision; planning the work; employee assignments; employees' attitudes; employee grievances; administering company policies, developing work interest. *Not open to students who have taken 45.513, 45.514, 45.515.* (Offered Fall and Summer Quarters)

45.641 Human Relations in Organizations (Intensive) (4 q.h.)

An introduction to human problems of the work environment: motivation, employee participation, formal and informal organizations, and leadership patterns. The processes of communication: interviewing, counseling, appraisal of performance, and the accomplishment of change. Special employment groups and overview of the individual in his organization. *Not open to students who have taken 45.511, 45.512.* (Offered Winter, Spring, and Summer Quarters) (Available on Suburban Campuses in Spring Quarter)

45.691 Creative Problem-Solving (2 q.h.)

New ways of thinking are learned and practiced. Sensing and analyzing problems, producing ideas, evaluating and implementing solutions. The attitudes and climate conducive to creative thinking as well as common barriers will be presented. Provides methods for developing imagination which is the key part of the creative process. (Offered Fall and Spring Quarters)

Quality Control and Management Sciences

Consultant: Prof. R. A. Parsons, College of Business 437-3255

45.536 Principles of Material Inspection (2 q.h.)

An operating and technical-level course involving mensuration, need and function of inspection and specifications; basic principles and techniques of measurement; various methods and equipment used for gauging and measuring; special measuring and inspection problems. (Offered Fall Quarter)

45.561 Statistical Quality Control I (2 q.h.)

Description and practical application of the basic statistical quality-control methods for quality assurance, quality control and quality improvement of products and services; the determination of process capability; the use of quality control charts for measurable and non-measurable quality characteristics. *Prereq.* 39.513. (Offered Fall Quarter)

45.562 Statistical Quality Control II (2 q.h.)

Continuation of Statistical Quality Control I, covering the application of statistical and probability considerations in acceptance sampling of purchased material, work in process, and outgoing products. Methods of predicting sampling results using the hypergeometric, the binomial, and the poisson distributions; development of the operating characteristic curve for any sampling plan; risks involved in sampling and the concepts of AQL, RQL, AOQL. *Prereq.* 45.561. (Offered Winter Quarter)

45.563 Management of Quality Control (2 q.h.)

Modern concepts of managing the quality function of a company to maximize customer satisfaction at minimum quality cost; the idea of total quality control; measurement of the cost of quality; development of a co-ordinated program of improvement, organizing for diagnosis the defect causes. (Offered Spring Quarter)

45.565 Industrial Experimentation I* (2 q.h.)

Modern small sample techniques are applied to industrial problems. Use of statistical inference to make estimates and set confidence intervals of key characteristics of production lots and processes; design of single and multiple factor experiments; tests of significance; analysis of variance. *Prereq.* 39.513. (Offered Winter Quarter)

45.566 Industrial Experimentation II* (2 q.h.)

Tests of significance, analysis of variance; correlation techniques; experimental design; balancing and randomizing techniques; factorial designs; nested designs; Latin square; random balance/multiple-balance. *Prereq.* 45.565. (Offered Spring Quarter)

*Upper level Business Administration course—see page 54.

45.608 Quality Control and Management (Intensive) (6 q.h.)

Same as 45.561, 45.562, and 45.563. *Not open to students who have taken these courses.* Prereq. 39.513. (Offered Fall and Summer Quarters)

45.630 Introduction to Operations Research (2 q.h.)

Decision making under uncertainty integration of classical statistics and decision theory with Bayesian concepts; decision tree analysis; preference curves. (Offered Fall Quarter)

45.631 Operations Research Applications I (2 q.h.)

Mathematical programming; linear programming; graphical, vector, simplex, and transportation methods; the dual; degeneracy; integer programming; non-linear programming; dynamic programming. (Offered Winter Quarter)

45.632 Operations Research Applications II (2 q.h.)

Special topics including model building, queuing theory, simulation, Pert-CPM, and game theory. (Offered Spring Quarter)

45.633 Advanced Quality Control I* (2 q.h.)

Detailed study of specialized techniques used in defect-cause diagnosis and problem analysis. Complete analysis of process capability; the multi-vari chart; pictograms the span plan method. Prereq. 45.562. (Offered Fall Quarter, 1975–1976)

45.634 Advanced Quality Control II* (2 q.h.)

Continuation of Advanced Quality Control I with special emphasis on design of control plans for process quality control and special cases of product acceptance. Prereq. 45.624. (Offered Winter Quarter, 1975–1976)

45.692 Quality Control I, II (Intensive) (4 q.h.)

Description and practical application of the basic statistical quality-control methods for quality assurance, quality, control, and quality improvement of products and services the determination of process capability; the use of quality control charts for measurable and non-measurable quality characteristics. The application of statistical and probability considerations in acceptance sampling of purchased material, work in process, and outgoing products. Methods of predicting sampling results using the hypergeometric, the binomial, and the poisson distributions; development of the operating characteristic curve for any sampling plan; risks involved in sampling and the concepts of AQL, RQL, AOQL. *Not open to students who have taken 45.561, 45.562.* Prereq. 39.513. (Offered in Winter Quarter)

Law

Consultant: Mr. H. Olins, Esq. 482-6998

45.541 Law I* (2 q.h.)

CONTRACTS: Nature, kinds, and formation of contracts; essential elements; interpretation of contracts.

*Upper level Business Administration course—see page 54.

45.542 Law II* (2 q.h.)

AGENCY: Nature, formation, and termination of agency relationships; rights and duties of principal and agent; scope of agent's authority.

SALES: Nature of sales contracts; warranties; transfer of title; rights and remedies of seller and buyer. Prereq. 45.541.

45.543 Law III* (2 q.h.)

NEGOTIABLE INSTRUMENTS: Bills, notes and checks; liabilities and defenses of parties; procedure upon dishonor; discharge.

BUSINESS ORGANIZATIONS: Survey of corporations and partnerships. Prereq. 45.542.

45.643 Law (Intensive)* (6 q.h.)

CONTRACTS: Nature, kinds, and formation of contracts; essential elements; interpretation of contracts.

AGENCY: Nature, formation, and termination of agency relationships; rights and duties of principal and agent; scope of agent's authority.

SALES: Nature of sales contracts warranties; transfer of title; rights and remedies of seller and buyer.

NEGOTIABLE INSTRUMENTS: Bills, notes, and checks; liabilities and defenses of parties; procedure upon dishonor; discharge.

BUSINESS ORGANIZATIONS: Survey of corporations and partnerships. Not open to students who have taken 45.541, 45.542, 45.543. (Offered Fall and Summer Quarters)

45.693 Law and Social Issues (2 q.h.)

A study of the structure and dynamics of the American Legal System approached through an analysis of selected cases dealing with social issues. (Offered every quarter)

Management Information Systems

Consultant: Mr. T. J. McNamara 479-4949

Coordinator: (EDP) Mr. R. M. Morrison 742-4000

45.570 Electronic Data Processing I (2 q.h.)

An introduction to computers including the discussion of numbering and coding systems; examples of typical business problems; and study of basic programming concepts. (Offered every quarter)

45.571 Electronic Data Processing II (2 q.h.)

A survey of available computer systems; price and performance comparison of available input, output, and storage media; discussion of filing and sorting techniques; and presentation of COBOL and other programming languages. Prereq. 45.570. (Offered every quarter)

45.572 Electronic Data Processing III (2 q.h.)

A presentation of data communications concepts and terminals; discussion of business data processing and operations research applications; and a summary of trends in EDP. Prereq. 45.571. (Offered every quarter)

*Upper level Business Administration course—see page 54.

45.648 Electronic Data Processing (Intensive) (6 q.h.)

An introduction to computers including the discussion of numbering and coding systems; examples of typical business problems; and study of basic programming concepts. A survey of available computer systems; price and performance comparison of available input, output, and storage media; discussion of filing and sorting techniques; and presentation of data communications concepts and terminals. A presentation of COBOL and other programming languages; discussion of business data processing and operations research applications; and a summary of trends in EDP. *Not open to students who have taken 45.570, 45.571, 45.572.* (Offered Fall, Spring and Summer Quarters) (Available on suburban campuses)

45.675, 45.676 Electronic Data Processing (A), (B) (6 q.h.)

An introduction to computers including the discussion of numbering and coding systems; examples to typical business problems; and study of basic programming concepts. A survey of available computer systems; price and performance comparison of available input, output, and storage media; discussion of filing and sorting techniques; and presentation of data communications concepts and terminals. A presentation of COBOL and other programming languages; discussion of business data processing and operations research applications, and a summary of trends in EDP.

Coordinator: (Programming) Mr. J. G. Sullivan 443-3122

45.599 Basic Computer Programming (2 q.h.)

A one quarter survey course in introductory computer programming for business students. Fundamentals of programming are introduced along with COBOL, Common Business Oriented Language. The divisions of COBOL, Data File Structure, verb actions are studied. Each student will prepare and check out programs using the University Computer Center. *Prereq.* 45.572. (Offered every quarter)

45.573 Computer Programming for Business I (2 q.h.)

Fundamentals of business application programming: Introduction to COBOL, Common Business Oriented Language, adopted as standard business programming language of EDP industry. Principles of flowcharting. Programs prepared by student are run and checked out using University's Computation Center computer. *Prereq.* 45.572. (Offered Fall and Winter Quarters)

45.574 Computer Programming for Business II (2 q.h.)

Programming in COBOL presented in more detail. Business data processing functions of editing, file updating, report writing are illustrated and implemented in programs prepared by students and run on University's computer. Programming involves punched card input and line printer output. *Prereq.* 45.573. (Offered Winter and Spring Quarters)

45.575 Computer Programming for Business III (2 q.h.)

More sophisticated programming techniques as applied to the solution of more complex business application problems. Random access disk file organization and processing is illustrated. Disk and magnetic tape files are utilized in problem solving. *Prereq.* 45.574. (Offered Spring and Summer Quarters)

*Upper level Business Administration course—see page 54.

45.617 Advanced Computer Programming I* (2 q.h.)

Introduction to assembler language programming using the University's computing system. Organization, representation, and processing data within the computer. Looping, instruction modification, indexing, indirect addressing and data retrieval are introduced. cursory survey of assembler languages in general. *Prereq. Demonstrate familiarity with any currently available computer language.*

45.618 Advanced Computer Programming II* (2 q.h.)

Further exploration of assembler language techniques, other addressing structures, floating point techniques, coding and use of macro instructions. Input-output routines, use of operating system for job scheduling, resource allocation, file handling. Business problems analyzed, flowcharted, programmed and debugged on University's computer by students. Debugging of problems by core dump analysis. *Preq. 45.617.*

45.619 Advanced Computer Programming III* (2 q.h.)

Utilization of business data processing hardware on University's computing system. Further use of operating system, divide independent file handling. Blocked and unblocked file manipulation. Application of assembler language to a sophisticated programming project. *Preq. 45.618.*

45.644 Computer Programming for Business (Intensive) (6 q.h.)

Fundamentals of business application programming: Introduction to COBOL, Common Business Oriented Language, adopted as standard business programming language of EDP industry. Principles of flowcharting. Programs prepared by students are run and checked out using the University's Computation Center computer. Programming in COBOL presented in more detail. Business data processing functions of editing, file updating, report writing are illustrated and implemented in programs prepared by students and run on the University's computer. Programming involving punched card input and line printer output. *Prereq. 45.527. Not open to students who have taken 45.573, 45.574, 45.575. (Offered Winter and Summer Quarters)*

45.677 Operating Systems I (2 q.h.)

Survey type course—describing operating systems and investigating the full range of systems services available under computer operating systems. Special emphasis is placed on their value as tools for developing management information. (Note: This quarter could stand alone as management tool for decision-making.) *Prereq. 45.575.*

45.678 Operating Systems II (2 q.h.)

Specific software covered will be systems supervisor, data management system, FORTRAN, COBOL, PL/1, and special purpose compilers. Also investigated will be operating systems which accommodate network analysis, Pert systems, simulation packages, and statistical analysis packages. *Prereq. 45.677.*

45.679 Operating Systems III (2 q.h.)

Detail analysis on data management systems with specific case studies and development of operating system programs. *Prereq. 45.678.*

*Upper level Business Administration course—see page 54.

45.680 Computer-Communications Systems Design and Analysis I (2 q.h.)

Discussion of computer-communications with emphasis on types of devices, communication lines; economic considerations such as line charges, types of lines, etc.—study of design and development considerations involved in a communications program—study of time-sharing programs and how they relate to communications programming. *Prereq.* 45.575.

45.681 Computer-Communications Systems Design and Analysis II (2 q.h.)

Discussion of types of communication programs such as information retrieval, message switching, data reception and transmission, and others. Buffering techniques for communications programs. *Prereq.* 45.680.

45.682 Computer-Communications Systems Design and Analysis III (2 q.h.)

Case studies in the design and development of several types of computer-communications programs. The student will develop flowcharts, systems definition system and program narratives, and documentation of programs pertinent to case studies. Student will check out communications programs under simulation. *Prereq.* 45.681.

45.684 RPG Programming (2 q.h.)

Provides a working knowledge of the Report Program Generation language. This language is suited to small scale computer usage for such tasks as: Report Generation; file up-dating; various utility functions. Students will write and debug class problems. (Offered Fall and Spring Quarters)

45.685 Computer Programming for Scientific Applications I* (2 q.h.)

Designed to provide the student with a working knowledge of FORTRAN, the modern problem oriented computer language. Enables the professional to understand the use of a computer in solving problems in business, mathematics, and the social and physical sciences by introducing him to problems in selected applications, and illustrating use of FORTRAN in finding solutions. *Prereq.* 45.572. (Offered Fall Quarter)

45.686 Computer Programming for Scientific Applications II* (2 q.h.)

The course provides the student with practical experience in the use of FORTRAN in solving significant problems in business, mathematics, and the social and physical sciences. Problems of sufficient complexity will be used to allow the student to actively participate in the various steps necessary to analyze, define, document, and solve the problem using FORTRAN. *Prereq.* 45.685. (Offered Winter Quarter)

45.687 Computer Programming for Scientific Applications III* (2 q.h.)

A sophisticated set of problems are presented to teams of students for solution. Consultations with instructor allows students to actively participate in solving problems with the use of FORTRAN. *Prereq.* 45.686. (Offered Spring Quarter)

Coordinator: (Systems) Mr. R. E. Anderson 862-6831

45.577 Data Systems Administration (2 q.h.)

The major phases involved in the study and detailed planning for the effective use of data processing equipment and management sciences in meeting the information needs of business are presented, including the analysis of company objectives, the feasibility study, the system specifications, equipment selection, and the implementation of the new system. *Prereq.* 45.572 (Offered in Fall and Summer Quarter) (Available on suburban campuses)

*Upper level Business Administration course—see page 54.

45.578 Business Data Processing Applications I (2 q.h.)

Each student is given an opportunity to understand and perceive a company as a total operating system. Specific systems applications examined include inventory control, purchasing, accounts payable, and their integration. Specific techniques on data collection including data communications are dealt with during the quarter. A field trip to a communications training center and a team case study project complete the quarter. *Prereq.* 45.577. (Offered Winter Quarter) (Available on suburban campuses)

45.579 Business Data Processing Applications II (2 q.h.)

A continuation of 45.578 covering additional information systems of accounts receivable, sales analysis, the design of integrated systems, a review of "on-line" systems and computer system simulation. The opportunity to participate in a computer simulation exercise is offered during a field trip. A team case study project completes the quarter. *Prereq.* 45.578. (Offered Spring Quarter) (Available on suburban campuses)

45.586 System Design and Techniques I (2 q.h.)

Introduction to system concepts, system department organization, forms design, systems controls, and manuals. *Prereq.* 45.503 or 45.572. (Available on suburban campuses)

45.587 System Design and Techniques II (2 q.h.)

Development of system techniques through lectures and case studies, including work simplification, work measurement, flow charting, system cost estimating, and system development. *Prereq.* 45.586.

45.588 System Design and Techniques III (2 q.h.)

Application of system techniques through extensive use of case studies covering the full spectrum of system development and design. *Prereq.* 45.587.

45.589 Advanced Business System Design I* (2 q.h.)

Introduction to total computer based system concepts, resource management, functional data flows, information feedback process, and major design criteria. *Prereq.* 45.588. (Available on suburban campuses)

45.590 Advanced Business System Design II* (2 q.h.)

Detailed analysis of a manufacturing company's business system design, focusing on data base design and subsystem relationships between order entry, production control, and inventory control. *Prereq.* 45.589.

45.591 Advanced Business System Design III* (2 q.h.)

Management information system design, including the impact of advanced capabilities such as data communication, on-line file storage, and simulation on the design and system approach. *Prereq.* 45.590.

45.592 Advanced Computer System Techniques I* (2 q.h.)

On-line data communication systems covering the range of services available, remote input and output devices, techniques of control, and application examples. *Prereq.* 45.591. (Available on suburban campuses)

*Upper level Business Administration course—see page 54.

45.593 Advanced Computer System Techniques II* (2 q.h.)

On-line mass storage devices, data base design, and file retrieval techniques. Real-time input-output techniques including visual and graphic displays. *Prereq.* 45.592.

45.594 Advanced Computer System Techniques III* (2 q.h.)

Time sharing system concepts, design, and languages. Application of on-line and time sharing system techniques through case studies and field trips. *Prereq.* 45.593.

45.616 Government Data Processing Applications I (2 q.h.)

Discusses the basic role of data processing in the current governmental activities in education (including computer assisted instruction), health (including patient care), welfare (including urban planning), information (including graphic storage and retrieval systems) through description of scientific advanced systems and equipment. *Prereq.* 45.572. (Available as Fall Quarter intensive)

45.653 Government Data Processing Applications II (2 q.h.)

Describes principal applications and specific advanced system designs and equipment which have been employed successfully by various levels of government in the fields of public administration, planning, finance, law enforcement and judicature, communication, and integrated information bases. *Prereq.* 45.616.

45.655 Auditing Data Processing Applications I (2 q.h.)

A general presentation of auditing techniques used when auditing typical electronic data processing installations. Functional assignment of duties within an electronic data processing installation. Control over input and output, and over data processing. Methodology of safeguarding record files, both physical and against unauthorized use. *Prereq.* 45.572. (Available as Fall and Spring Quarter intensive)

45.656 Auditing Data Processing Applications II (2 q.h.)

A continuation of auditing applications when reviewed for internal control, hardware checks, system checks, and audit trail. Auditing around the computer versus through the computer. Using the computer to test the Data Processing system and also the records produced by the computer system. Auditing advanced Data Processing systems. *Prereq.* 45.655.

45.658 Retail Marketing & Distribution Data Processing Applications I (2 q.h.)

Analyzes the unique characteristics of the retail application including high volume of transactions, low unit value, decentralized input, short term employees, multi-level reporting and their effects on the EDP systems requirements in each of the classical areas of the organization. *Prereq.* 45.572. (Available as Fall Quarter intensive)

45.659 Retail Marketing & Distribution Data Processing Applications II (2 q.h.)

Develops the systems considerations of the first quarter further into the requirements of an overall, integrated management information system for retail. *Prereq.* 45.658.

*Upper level Business Administration course—see page 54.

45.661 Banking Data Processing Applications I (2 q.h.)

Reviews the major functions of banking, deposit loan and money, and analyzes their uniqueness from an EDP point of view in the applications of demand deposit accounting, commercial, and installment loan accounting, bank credit card accounting, and credit file maintenance. *Prereq.* 45.572. (Available as Fall Quarter intensive)

45.662. Banking Data Processing Applications II (2 q.h.)

Expands on first quarter by analyzing mortgage accounting, savings accounting, mutual fund and stock transfer accounting, personal trust accounting, new remote terminals and the development of management information systems for commercial banks and thrift institutions. *Prereq.* 45.661.

45.664 EDP in Property and Casualty Insurance I (2 q.h.)

A survey of the various functions unique to property and casualty industry and the role of data processing as applied to the particular functions: underwriting, policy production claims, and actuarial. *Prereq.* 45.572.

45.665 EDP in Property and Casualty Insurance II (2 q.h.)

Application of the principles surveyed in the first quarter to one or more case studies developing an information system for property and casualty company management. *Prereq.* 45.664.

45.668 Peripheral Systems Techniques I (2 q.h.)

This course deals with the many peripheral skills and techniques which the modern analyst must employ in his daily activities. Specific areas to be covered include the systems approach to decision-making, interviewing, preparing and presenting proposals to executive management, techniques of documentation. *Prereq.* 45.573. (Offered Winter Quarter)

45.669 Peripheral Systems Techniques II (2 q.h.)

A continuation of 45.668. This course will cover such topics as the impact of the systems analyst as a trainer; organizational employers of third generation computers; control and systems auditing, and the establishment of data processing standards. *Prereq.* 45.668. (Offered Spring Quarter)

45.694 Systems Design & Techniques (Intensive) (6 q.h.)

Introduction to system concepts, system department organization, forms design, systems controls, and manuals. Development of system techniques through lectures and case studies, including work simplification, work measurement, flow charting, system cost estimating, and system development. Application of system techniques through extensive use of case studies covering the full spectrum of development and design. Not open to students who have taken 45.586, 45.587, 45.588. *Prereq.* 45.503 or 45.572. (Offered Spring and Summer Quarters)

45.697 Information Processing In Medicine I (2 q.h.)

A non-technical survey of the impact and potential of computers in medicine: medical records; clinical reporting systems; automated laboratories; on-line monitoring; research needs; medical administration requirements. *Prereq.* none. (Offered Fall Quarter)

45.698 Information Processing in Medicine II (2 q.h.)

Analysis of the content and interactions of medical information sub-systems. Implications of computerization of various medical activities; equipment selection; organizational considerations. *Prereq.* 45.697. (Offered Winter Quarter)

47—REAL ESTATE

Consultant: Mr. G. D. Prigmore 536-2474

47.501 Real Estate Fundamentals I (2 q.h.)

An introduction to the fundamentals of real estate including basic terminology and various types of purchase contracts. Real estate brokerage and leasing fundamentals in commercial, office, and residential properties will also be explored. (Offered Fall, Winter, and Spring Quarters) (Available on suburban campuses)

47.502 Real Estate Fundamentals II (2 q.h.)

A general examination of real property management with emphasis on the special characteristics of different types of property, along with introduction to valuation of property, including analysis of operating statements. *Prereq.* 47.501 or permission of instructor. (Offered Winter, Spring, and Summer Quarters)

47.503 Real Estate Fundamentals III (2 q.h.)

Real Estate financing will be explored with respect to the various types of institutions involved in the financing of different properties, including interim, permanent, and secondary financing. Specific case studies will also be used. *Prereq.* 47.502 or permission of instructor. (Offered Spring, Summer, and Fall Quarters)

47.504 Real Estate Fundamentals (Intensive) (6 q.h.)

Same as 57.501, 502 and 503. Not open to students who have taken those courses. (Offered Summer Quarter)

47.508 Real Estate Financial Analysis I (2 q.h.)

Structure and analysis of real estate income and expense statements. Sources of funds, borrowing methods, effects of taxation, rates of return, etc. *Prereq.* 47.503 or permission of instructor. (Offered Fall Quarter) (Available on suburban campuses)

47.509 Real Estate Financial Analysis II (2 q.h.)

Analysis of risks and problems involved in financing real property with emphasis on use of case studies and problems. Class participation stressed. *Prereq.* 47.508, or permission of instructor. (Offered Winter Quarter)

47.511 Fundamental Real Estate Appraisal (2 q.h.)

A fundamental course in real estate appraisal with emphasis on single- and two- and three-family properties. Analysis of city and neighborhood influences, site valuation, building diagnosis, depreciation, study of the applicable approaches to value, appraisal report preparation. *Prereq.* 47.503 or permission of instructor. (Offered Fall Quarter) (Available on suburban campuses)

47.512, 47.513 Advanced Real Estate Appraisal I & II (4 q.h.)

An advanced course in the evaluation of residential and income properties. Application of the cost, market, and income approaches to apartment buildings and commercial and industrial developments. Particular emphasis on the various methods of capitalization and residual techniques. Class participation in case studies and problems. *Prereq.* 47.511, 47.512, or *permission of instructor.* (Offered Winter and Spring Quarters) (Available on suburban campuses)

47.521 Real Estate Development (2 q.h.)

Analysis of the problems in real estate development using the case method. Emphasis on the risks and opportunities which face developers in the planning, marketing, construction, and financing of apartments, shopping centers, and office buildings. *Prereq.* 47.509 or *permission of instructor.* (Offered Spring Quarter)

47.527 Housing (2 q.h.)

A specialized course dealing with the demand for housing and the ability of the private market to meet the demand. Particular emphasis placed on public programs dealing with housing via the private sector. *Prereq.* 47.509 or *permission of Instructor.* (Offered Spring Quarter)

47.524 Private Real Estate Law (2 q.h.)

Elements of a real estate contract and its enforceability; the concept of title; mortgages and their purposes; recording of real estate interests; the landlord and tenant relationship. *Prereq.* 47.503 or *permission of instructor.* (Offered Fall Quarter)

47.525, 47.526 Public Real Estate Law I & II (4 q.h.)

This course will focus on zoning, subdivision control, conservation controls, taxation of real estate, rent control, eminent domain, and urban renewal. *Prereq.* 47.503, 47.525, or *permission of instructor.* (Offered Winter and Spring Quarters)

47.528, 47.529, 47.530 Real Estate Management I, II, III (6 q.h.)

A course designed to prepare the student with the practical problems of real estate management. The course stresses the requisite day-to-day management of commercial, industrial, and residential properties as well as the need for a management strategy as it relates to long-term property value. *Prereq.* none.

48—TRANSPORTATION & PHYSICAL DISTRIBUTION MANAGEMENT

Consultant: Dr. R. C. Lieb, College of Business 437-3236

48.514 Elements of Transportation and Distribution I (2 q.h.)

An introduction to regulatory, economic, and management aspects of transportation from the viewpoints of shippers, government, and carrier managers. Topics include: costs, rates, operations, entry, mergers, intercity passenger and urban transportation. A course of general interest to students of business, law or government. *Prereq. for all other courses in transportation. (Not open to students who have completed course numbers 48.501, 48.502, 48.503.)* (Available on suburban campuses)

48.515 Elements of Transportation and Distribution II (2 q.h.)

An introduction to physical distribution management concepts. Topics include marketing, locational strategy, organization, inventory control, forecasting, and cost control. Course uses text and case materials developed from industry situations. *Prereq.* 48.514. (Not open to students who have completed course numbers 48.501, 48.502, 48.503.)

48.516 Elements of Transportation and Distribution III (2 q.h.)

Continued examination of the major elements of the physical distribution mix. Topics include: information flow, data processing, warehousing, and labor relations. Cases include application of the "total cost" approach to physical distribution. *Prereq.* 48.514. (Not open to students who have completed course numbers 48.501, 48.502, 48.503.)

48.504 Transportation Regulation and Promotion I (2 q.h.)

Study of the history and content of the Interstate Commerce Act. *Prereq.* 48.527, 48.514, or former course numbers 48.503 and 48.526.

48.505 Transportation Regulation and Promotion II (2 q.h.)

Examination of administrative law and procedure, the code of ethics and the general rules of practice. *Prereq.* 48.504.

48.506 Transportation Regulation and Promotion III (2 q.h.)

Analysis of cases pertinent to the Commerce Clause. Preparation for ICC Practitioners Exam. *Prereq.* 48.505.

48.527 Traffic Management I—Rates and Tariffs (2 q.h.)

A practical course in the interpretation and use of tariffs. Topics include classifications, rate scales, tariff rules, rate making procedures, etc. *Prereq.* 48.514 or former course numbers 48.501, 48.502, 48.503. (Not open to students who have taken former course numbers 48.524, 48.525, 48.526.)

48.528 Traffic Management II—Rates and Tariffs (2 q.h.)

An advanced course in the interpretation and use of tariffs. Topics include ICC law and practice, and computerized tariffs. *Prereq.* 48.527. (Not open to students who have taken former course numbers 48.524, 48.525, 48.526.)

48.529 Traffic Management III—Selected Topics (2 q.h.)

A practical course in traffic management covering topics other than rates and tariffs. Subjects include: routing, claims, insurance, consolidation, packaging, etc. Course uses cases and text. *Prereq.* 48.514 or former course numbers 48.501, 48.502, 48.503. (Not open to students who have taken former course numbers 48.524, 48.525, 48.526.)

48.534 Surface Transportation I—Railroad Management (2 q.h.)

A management-oriented course that considers the current and future status of the railroads. Topics include: investment and finance, mergers, marketing, labor relations, operations and control, diversification, and public policy. *Prereq.* 48.514 or former course numbers 48.501, 48.502, 48.503. (Replaces former course number 48.511 and 48.512.) (Offered Fall Quarter)

48.535 Surface Transportation II—Motor Carrier Management (2 q.h.)

A management-oriented course that considers the current and future status of the regulated motor-carrier industry. Topics include: equipment selection and finance, mergers, marketing, labor relations, routes, operations and control, and public policy. *Prereq.* 48.514 or former course numbers 48.501, 48.502, 48.503. (Replaces former course numbers 48.517, 48.518.) (Offered Winter Quarter)

48.536 Surface Transportation III—Marine Transportation Management (2 q.h.)

A management-oriented course that considers the current and future status of the U.S. Merchant Marine. Topics include: international trade patterns, government promotion and subsidy, technological innovations, port facilities, and labor relations. *Prereq.* 48.514 or former course numbers 48.501, 48.502, 48.503. (Replaces former course number 48.513.) (Offered Spring Quarter)

48.537 Surface Transportation IV—Private Trucking Management (2 q.h.)

Initiating a private trucking operation. Topics include legality, purchase vs. lease of equipment, operations, and measures of performance. *Prereq.* 48.514 or former course numbers 48.501, 48.502, 48.503. (Replaces former course number 48.519.) (Offered Spring Quarter)

48.538 Management of Warehouse Operations (2 q.h.)

A practical course in the management of warehouses. Topics include: site selection, construction, finance, operations, measurement of performance, and warehouse technology. *Prereq.* 48.514, 48.515, 48.516 (Replaces former course number 48.521.) (Offered Fall Quarter, 1974–1975)

48.539 Organization and Control of Physical Distribution Management (2 q.h.)

Establishment of a physical distribution organization. Measuring performance. Interrelationships with other functions in the company. Interpersonal relations. *Prereq.* 48.514, 48.515, 48.516 (Replaces former course number 48.522.) (Offered Winter Quarter, 1974–1975)

48.540 Management Science and Physical Distribution Management (2 q.h.)

Application of quantitative techniques to physical-distribution management, including: linear programming, simulation, and statistical decision theory. Students will use computer facilities for solving problems. Knowledge of programming is not required. *Prereq.* 48.514, 48.515, 48.516 or 10.539 (math), or its equivalent. (Replaces former course number 48.523.) (Not offered 1974–1975)

48.541 Air Transportation Management I (2 q.h.)

Economics and regulation of Civil Aeronautics Board certified commercial passenger aviation—including routes, schedules, operations, pricing, mergers, cost analysis, and financing. Case method of instruction emphasized. *Prereq.* 48.514. (Offered Burlington Campus only)

48.542 Air Transportation Management II (2 q.h.)

Similar topics as 48.541, but for cargo operations. *Prereq.* 48.541.

48.543 Air Transportation Management III (2 q.h.)

Economics and regulation of general aviation including analysis of corporate, air taxi, and third level operations. *Prereq.* 48.542.

48.547 Urban Transportation I (2 q.h.)

The planning and financing of urban transportation systems. Role of federal, state, and local governments. Choice of technology and method of financing. The concept of "balanced" transportation. *Prereq.* 48.514 (*Replaces former course number 48.544.*) (Offered Fall Quarter, 1975–1976)

48.548 Urban Transportation II (2 q.h.)

Management of urban transportation systems. Topics include: routes and services, pricing, labor relations, selection of equipment, community relations, and measures of performance. *Prereq.* 48.547. (*Replaces former course numbers 48.545, 48.546.*) (Offered Winter Quarter, 1975–1976)

48.549 Seminar in Selected Transportation and Physical Distribution Management Topics

A seminar which focuses on a topic of particular interest during the academic year, for example, reappraisal and formulation of National Transportation Policy, labor relations in transportation, ecology and transportation, etc. The seminar will utilize speakers and published materials and will require a written or oral presentation by the students at the end of the course. The seminar topic will be announced during the academic year in time for registration for the Spring term. *Prereq.* 48.514. (Offered Spring Quarter, 1974–1975)

48.600 Seminar in Northeast Corridor Transportation (2 q.h.)

Analysis of the demand for and supply of passenger and freight transportation in the Northeast Corridor. Topics include: government policy, technology, carrier strategy, the consumer, and interrelationships between transportation and economic activity. Students make a presentation of their research findings at the end of the course. This course should be of interest to students of business, government, engineering, economics, and planning. *Prereq.* 48.514 and 10.539 (*math*), or its equivalent. (Offered Spring Quarter, 1975–1976)

50—EDUCATION FOUNDATIONS**50.111 Social Science I (3 cl., 3 q.h.)**

Cultural anthropology and education. Theories and concepts in cultural anthropology will be studied with primary emphasis on their relevance to informal and formal aspects of educational processes. Considerable attention will be devoted to the study of cross cultural materials in order to understand the educational process in different cultural milieus.

50.112 Social Sciences II (3 cl., 3 q.h.)

Sociology and education. Involves sociological analysis of the educational enterprise in the United States and other technologically advanced societies, including consideration of the socialization process, the formation of youth cultures, and the function of the schools in these contexts. Attention will be given to the study of the effects of stratification, ethnic, and racial factors on educational institutions, education and social change, and the school as a social system.

50.113 Social Science III (3 cl., 3 q.h.)

Intergroup relations and education. Examination of theoretical and empirical materials relative to the problem of intergroup relations and prejudice. Particular attention will be paid to the role of education in the reduction of intergroup conflict.

50.121 Human Development and Learning I (4 cl., 4 q.h.)

Developmental processes from prenatal life up to adolescence, theories of learning and personality, with research and case material covering major aspects of psychological development.

50.131 Human Development and Learning II (4 cl., 4 q.h.)

Continuation of Human Development and Learning I. Significant aspects of adolescence—physical, social, and psychological factors as they influence adolescent behavior. *Prereq.* 50.121.

50.141 Measurement and Evaluation (4 cl., 4 q.h.)

The fundamentals of measurement; basic statistical concepts and techniques used; evaluation of standardized and teacher-made tests. *Prereq.* Meth. and Mat. course in maj. field.

50.151 Backgrounds of American Education (4 cl., 4 q.h.)

Historical and philosophical foundations of American education beginning with old-world origins; development of American schools and educational thought from the colonial period to the present with emphasis on major current issues in education. *Prereq.* 50.141.

51—EDUCATION — INSTRUCTION

51.135 Analysis of Teaching and Educational Process (4 cl., 4 q.h.)

The relationships that exist between instructional objectives and teaching behavior; applications of human development and learning concepts as they relate to subsequent specialized teaching methods and materials. Research results and promising theory are used to extend the prospective teacher's concepts of the teaching function. *Prereq.* 50.131.

51.143 Methods and Materials of Teaching English (4 cl., 4 q.h.)

An introduction to the structure and functions of language as they apply to the teaching of English; curriculum and planning in English; the unit approach; specific techniques of teaching reading and literature, grammar and usage, written and oral composition, listening, spelling, vocabulary, and the use of mass media. *Prereq.* 51.135.

51.151 Student Teaching with Related Seminar (8 q.h.)

A University-arranged practicum of observation and teaching in schools within reasonable commuting distance of Northeastern. Participating on a full-time basis, the student is expected to develop planning and communication abilities within his major field. Biweekly seminars at the University provide additional opportunity to analyze theory-practice relationships and to examine generic problems of teaching. *Prereq.* Permission of adviser.

54—EDUCATION — READING

54.126 Teaching Reading in Secondary Schools (4 cl., 4 q.h.)

For English and social studies majors in the College of Education who are preparing for teaching in the junior or senior high schools. Basically the same approach and organization applies to this course as to the elementary level course.

63—THERAPEUTIC RECREATION SERVICES**63.501 Introduction to Therapeutic Recreation Services (2 q.h.)**

Philosophy and scope of modern recreation and its role in society.

63.510 Philosophy of Recreation and Leisure (2 q.h.)

Goals for American recreation studied in modern context; implications for the professional; historical background, concepts of work, leisure, recreation; trends, issues, and future direction.

63.521 Recreational Skills I (Social Recreation) (2 q.h.)

Techniques of leadership, planning, and motivation for social-recreation activities; mixers, table games, active and inactive group games, adapting and creating games.

63.522 Recreation Skills II (Music Therapy) (2 q.h.)

Theory and practical application of music activities in special therapeutic settings.

63.523 Recreation Skills III (Guitar or Auto Harp) (2 q.h.)

An introductory course in tablature reading; designed to develop personal skills for accompaniment of group singing.

63.531 Techniques of Recreation Leadership (2 q.h.)

Study and practical experience in a diversity of group programs and processes.

63.532 Interagency Planning for Community Action (2 q.h.)

A study of agencies and how they function (program and personnel); how agencies cooperate for interagency programming. Legal and financial aspects and their effect on the program.

63.535 Recreation Skills VI (Special Events and Programs) (2 q.h.)

How to organize and administrate tournaments for selected activities; checkers, chess, card games, table games, party planning, and techniques.

63.547 Outdoor Education for Handicapped (2 q.h.)

Technical training and experiences for adapted recreation and education for exceptional and handicapped age groups.

63.549 The Process of Aging (2 q.h.)

The experience and viewpoints from leading professional people—from the fields of medicine, psychiatry, sociology, nursing, rehabilitation, research, counseling, education, and recreation—related to the process of aging.

63.550 Group Dynamics I (2 q.h.)

The group process; how groups arrive at group identity; factors influencing size, purpose, behavior patterns, selections of individual members; training and experience in leadership techniques.

63.551 Group Dynamics II (2 q.h.)

A continuation of Group Dynamics I. *Prereq.* 63.550.

63.552 Leadership and Program for Ill, Aged, and Infirm (2 q.h.)

The scope of program planning and leadership in a variety of activities including adapted square dances, drama and puppetry, developing a rhythm band, parties and special events, active and quiet games, and others.

63.553 Techniques and Resources in Working with Elderly (2 q.h.)

Course on how to deal with day to day problems such as the ability to converse or understand different languages; understanding diseases and disabilities of the aged; techniques in assisting the blind or deaf; sensitivity training and sources of assistance in these areas.

63.555 Therapeutic Recreation for Special Groups (2 q.h.)

Concentrated study and individual projects in areas of special interest; mentally retarded, handicapped, aging, and culturally deprived, socially atypical, others.

63.556 Workshop in Adapted and Hospital Recreation (2 q.h.)

Investigation in depth of basic and recent developments in adaptive and hospital recreation. Reports, discussions, observations, and visitations.

63.557 Recreation Activities of Atypical Individuals and Groups (2 q.h.)

Adaptation of recreational activities to meet the needs of handicapped individuals in hospitals and other organizations offering recreation programs for handicapped. Emphasis on the basic principles of recreational therapy.

63.560 Development and Utilization of Recreation Education Resources (2 q.h.)

Survey of field and audio-visual education and resources; instruction and practice in the use of equipment and materials.

63.570 Arts and Crafts I (2 q.h.)

Opportunities to learn and to teach in various media: clay, paper, crayon, paint, print, leather, wood, metal, yarn, natural and scrap materials; emphasis on creativity.

63.571 Arts and Crafts II (2 q.h.)

Course is geared to teach design skills and craft skills at the same time. Present the basic elements of design to plaster, stone, metal, papier mache, clay, wood, wire, cloth, and wax, and exploit the qualities of each medium. *Prereq.* 63.570.

63.572 Arts and Crafts III (2 q.h.)

Continuation of Arts and Crafts II. *Prereq.* 63.571.

63.592 Independent Study (3 q.h.)

Independent study designed for the individual specific needs. Field assignments in nursing homes for practical experience. Special and specific assignments. *Prereq.* 63.501.

63.593 Independent Study (4 q.h.)

Continuation of 63.592. *Prereq.* 63.592.

63.600 Seminar in Group Dynamics (2 q.h.)

Seminar covering all aspects of motivation, behavior patterns and the general process procedures. *Prereq.* 63.551.

86 & 87—HEALTH PROFESSIONS

Courses open to all students

86.502 Hospital Law and Ethics (2 q.h.)

A study of important legal principles and rulings of importance to medical administrative personnel and others. Brief introduction to interpersonal ethics in patient care.

86.504 Foundations of Medical Science I (2 q.h.)

Study, primarily through physicians' lectures, of major disease problems in our society and modes of treatment. Intended for the non-medical student who wishes an understanding of the problems faced by the physician in daily practice, to facilitate communication between medical and non-medical members of the health team. Discusses organized care, diagnosis, and treatment.

86.505 Foundations of Medical Science II (2 q.h.)

A continuation of 86.504, emphasizing reproduction, birth, pediatrics. Dental health and dermatology also discussed.

86.506 Foundations of Medical Science III (2 q.h.)

A continuation of 86.505. Heart disease; cancer; stroke; blood and lymphatic diseases; accidents; musculo-skeletal, respiratory, and gastro-intestinal diseases.

86.507 Medical Terminology I (2 q.h.)

An intensive introduction to medical terminology including stems, prefixes, and suffixes. Practice in usage.

86.508 Medical Terminology II (2 q.h.)

A more extensive and in-depth consideration of medical terminology. Intended for the medical records specialist. Prereq. 86.507.

86.509 Medical Terminology (4 q.h.)

Combines the content of 86.507 and 86.508.

86.511 Personal & Community Health (2 q.h.)

Principles of personal health and healthful living and their application to interpersonal relationships and community life. Discusses important contemporary health problems.

86.512 Foundations of Medical Science (3 q.h.)

Combines the content of 86.504 and the first half of 86.505. Offered for day programs only.

86.513 Foundations of Medical Science (3 q.h.)

Combines the content of the second half of 86.505 and 86.506. Offered for day programs only.

86.515 Home Health Care (3 q.h.)

A combination lecture and field training program designed to provide the technical skills required for the provision of effective community home health care. Prereq. permission from the dean.

86.516 Principles and Practice of Community Mental Health (3 q.h.)

The course will provide a rudimentary understanding of the basic principles and techniques of modern community mental health practice. Supervised clinical experience will be provided.

86.521 Public Health I (2 q.h.)

Principles of public health. Organization of health agencies and services.

86.522 Public Health II (2 q.h.)

Continuation of 86.521, emphasizing community organization for health services. *Prereq.* 86.521.

86.524 Methods & Materials in Public Health Education (2 q.h.)

An introduction to health education in the public health context. *Prereq.* 86.511 or 86.522.

86.531 Man's Present Environment (2 q.h.)

A survey of environmental conditions in land, air, and water. The causes of pollution; effects on man and other life; and a general discussion of current control methods. Particular emphasis on the significance of environmental problems to the individual.

86.532 Environmental Problems and Control (2 q.h.)

Aspects of environmental engineering on a municipal scale are presented in a format directed to the nonprofessional. Discussion of topics in water supply and water quality, waste water treatment and disposal, solid waste management, milk and food sanitation, and noise control, in the language of the interested citizen.

86.533 Pollution and the Global Environment (2 q.h.)

Threats to the environment on a global scale from man's activities, and an examination of various methods and recommendations for control of atmospheric, oceanic, and land pollution.

86.541 Medical Care & Current Social Problems I (2 q.h.)

Seminar course discussing society's organization to deliver medical care services. *Prereq.* permission from the dean.

86.542 Medical Care & Current Social Problems II (2 q.h.)

A continuation of 86.541 discussing topics identified in the first part of the course as matters of great concern in the field of medical care. *Prereq.* 86.541.

86.543 Medical Care & Current Social Problems III (2 q.h.)

A continuation of 86.542, examining current professional literature of medical care. *Prereq.* 86.542.

86.545 & 86.546 Contemporary & Controversial Issues in Family Health I, II (4 q.h.)

A survey of Contemporary Health Topics will be offered. Timely issues will be analyzed to differentiate fact and opinion. The course is designed for non-medical individuals desiring authentic information on current health matters. General and mental health topics will be covered.

86.548 The Health of the Young Child (2 q.h.)

A course for people working in health programs that reach out to families through clinics, schools, etc. Emphasis on early child development, on relating to the child in his immediate environment, and on expanding observation skills to increase early identification of children with special needs.

86.571 Long-Term Care Administration I (2 q.h.)

The organization of care for the long-term acute and chronically ill patient. Goals and purposes of nursing homes; types. Budgeting, financing, administration, and services.

86.572 Long-Term Care Administration II (2 q.h.)

Nursing units; role of the physician. Nursing home-hospital relationships. Therapies. Social Work. *Prereq.* 86.571 or *permission from the Dean.*

86.573 Long-Term Care Administration III (2 q.h.)

Design of long-term care facilities, capital funding, staffing, budgeting, public relations. *Prereq.* 86.572 or *permission from the Dean.*

86.539 Health, Disease & Disability I (2 q.h.) (Formerly 86.574)

A study of the major disease or disability states and their impact on human physiology and psychology. Social and individual response to these states. Lectures, demonstrations, field visits. Part I emphasizes medical areas. *Prereq.* 86.506 or 86.513, and 18.306, 18.309, or 18.326.

86.540 Health, Disease & Disability II (2 q.h.) (Formerly 86.575)

A continuation of 86.574. Part II emphasizes surgical areas. *Prereq.* 86.574

86.577 Long-Term Care Administration IV (2 q.h.)

The nature and problems of aging—individual and social considerations. *Prereq.* 86.573.

86.578 Long-Term Care Administration V (2 q.h.)

The care of elderly patients in home, community, and institutions. *Prereq.* 86.577.

86.579 Long-Term Care Administration VI

Seminar course on the provision and improvement of services to the elderly. *Prereq.* 86.578.

86.581 Hospital Organization & Management I (2 q.h.)

The history and development of hospitals—the contemporary hospital system. Different types of hospital organizations. For middle-management personnel.

86.582 Hospital Organization & Management II (2 q.h.)

A continuation of 86.581; hospital departments, their organization, functions, and interrelationships. For middle-management personnel. *Prereq.* 86.581.

86.583 Hospital Organization & Management III (2 q.h.)

A continuation of 86.582. New methods of patient care. For middle-management personnel. *Prereq.* 86.582.

*Courses Open to Medical Record Students Only***86.544 Medical Records Field Practice & Research Seminar (3 q.h.)**

Full-time field assignment in affiliated hospital medical record departments with research assignments and regularly scheduled seminar and conference sessions. *Prereq.* 85.558 & permission.

85.551 Organization of the Medical Record Department I (2 q.h.)

The study of the hospital, patterns of organization, lines of responsibility and authority, medical staff and administrative organization, departmental functions and organization. The planning aspects of management are stressed. *Prereq.* 86.556.

86.552 Organization of the Medical Record Department II (2 q.h.)

The study of fundamental principles and successful practices in getting office work accomplished. Office management problems and their solution, conceptive framework for the operation of essential management function, facilities, solutions, and contributions to the office.

86.553 Organization of the Medical Record Department III (2 q.h.)

The study of the controlling function in the Medical Record Department. Quality control, time standards, cash controlling, budgeting, and office manuals. Work simplification and systems as it applies to the Medical Record Department.

86.554 Medical Record Science I (4 q.h.)

Introduction to medical records; history of the medical record, and medical record forms. A study of the professional medical record administrator and his relationship to the health facility. Medical staff and committees in the hospital. Quantitative analysis of the medical record. *Prereq.* 80 q.h. of credit including 18.524, 18.525, 18.526, and 86.507 and 86.508.

86.555 Medical Record Science II (4 q.h.)

A study of the numbering, filing, securing, and preserving of medical records. Includes the study of principles of law as related to patient care and medical records. Study and practice of medical transcription. The rules of privileged communications and the release of information to agencies stressed. *Prereq.* 86.554.

86.556 Medical Record Science III (4 q.h.)

A study of the basic principles of compiling statistics for hospitals and other health institutions. Includes the preparation of the daily census, discharge analysis, monthly, annual, and special reports. Birth and death certificates. *Prereq.* 86.555.

86.557 Medical Record Science IV (4 q.h.)

Principles of standardized nomenclature of diseases and operations. International classification of diseases, adapted—8. Study of other indexes used in Medical Record Department, directed laboratory practice for proficiency. *Prereq.* 86.556 and 86.506.

86.558 Medical Record Science V (4 q.h.)

A study of the new and advanced aspects of medical record science. Includes such topics as skilled nursing facilities, neighborhood health centers, utilization review, PSRO, and cancer registry. *Prereq.* 86.557

86.559. Current Issues in Medical Record Administration (2 q.h.)

Seminar course discussing new problems presented by changing patterns of medical care. Review of the current literature. *Prereq. permission.*

86.564. Seminar in Medical Record Science (Open only to full-time medical record majors during senior year) (3 q.h.)

Class discussion of experiences in the clinical setting. Assigned outside projects. Supervised practice.

86.585 Medical Record Computer Science (2 q.h.)

Electronic data processing applications in the medical record environment. The study of the hospital information system. Application of computers in hospital methodology and assessing the need for EDP in medical record-environment. Trends in the state of the art and future prospects for medical record management. *Prereq. EDP I and II.*

86.586 Applied Medical Record Science I (3 q.h.)

Clinical practice in medical record science and management techniques at one or more of the affiliated hospitals.

86.587 Applied Medical Record Science II (3 q.h.)

Clinical practice in medical record science and management techniques at one or more of the affiliated hospitals.

86.588 Applied Medical Record Science III (2 q.h.)

Clinical practice in medical record science and management techniques at one or more of the affiliated hospitals.

Courses open to Respiratory Therapy Students only.

86.591 Introduction to Respiratory Therapy I (4 q.h.)

The development and understanding of the respiratory therapist's role as a member of the health care profession. A concise survey of the normal structures and functions of the human body with particular emphasis on the organs of respiration and circulation and the principle of oxygen transport and tissue metabolism. An introduction to the physical principles governing gas exchange and the design of mechanical equipment. *Prereq. permission.*

86.592 Introduction to Respiratory Therapy II (4 q.h.)

A continuation of 86.591 with emphasis on ventilation, acid-base balance, blood gases, cardiovascular physiology, and clinical cardiopulmonary pathology.

86.593 Introduction to Respiratory Therapy III (4 q.h.)

An expansion of 86.591 and 86.592 with emphasis on therapy modalities in current use. Topics covered include gas administration systems, humidity and nebulization, mechanical ventilation, and pulmonary function equipment. Special attention is given to the physical and microbial care necessary in applying these modalities.

Courses open to Special Respiratory Therapy Program Students only.

86.691 Applied Clinical Study I (2 q.h.)

A presentation of the techniques, skills, and rationale for the effective administration of gas, humidity, and aerosol therapy. Also introduce the student to quality patient care concepts necessary to develop the ability to function as a member of the health care team. *Prereq.* 86.591.

86.692 Applied Clinical Study II (2 q.h.)

A presentation of the techniques, skills, and rationale for the proper and effective administration of intermittent positive pressure breathing and chest physiotherapy with practical clinical application of both. An introduction to the basic concepts of microbiology and problems of immunization with stress on the clinical problems of infection and the techniques of cleaning and sterilization in the clinical setting. *Prereq.* 86.691.

86.693 Applied Clinical Study III (2 q.h.)

An introduction to the skills, techniques, and rationale necessary to perform proper and effective airway management, cardiopulmonary resuscitation and artificial ventilation therapy presented in the laboratory setting with emphasis on the development of manual dexterity prior to clinical application. *Prereq.* 86.692.

86.694 Applied Clinical Study IV (6 q.h.)

Clinical application of the techniques and skills acquired in the preceding three quarters, with emphasis on the development of an individual who will provide safe and effective respiratory care, together with a basic introduction to pharmacology, clinical medicine, and disease entities. *Prereq.* 86.693.

Courses open to Radiologic Technology Students.

86.614 Advanced Radiologic Technology I (2 cl., 2 q.h.)

Review of basic principles; new equipment (operation); special procedures; thermography; ultrasound and video; anatomy and physiology. *Prereq.* R. T. or special permission.

86.615 Advanced Radiologic Technology II (2 cl., 2 q.h.)

The study of specialized procedures which utilize advanced and sophisticated equipment in the field of: neurology; cardio-vascular, pediatrics, tomography, intraoral, operative procedures. *Prereq.* 86.614.

86.616 Advanced Radiologic Technology III (2 cl., 2 q.h.)

Accounting principles; budgeting, preparing schedules; personnel practices. *Prereq.* 86.615.

86.617 Radioactive Isotopes and Therapy I (2 cl., 2 q.h.)

Review of physics, mathematics, anatomy, treatment planning, radiation units of measurement, and introduction to radioisotopes. *Prereq.* 86.616.

86.618 Radioactive Isotopes and Therapy II (2 cl., 2 q.h.)

Radiobiology, nursing procedures, protection and shielding, and supervoltage equipment. *Prereq.* 86.617.

86.619 Radioactive Isotopes and Therapy III (2 cl., 2 q.h.)

Specific procedures, records and administrative procedures, clinical application, and radiobiology. *Prereq.* 86.618.

86.620 Radiologic Technology Orientation I (2 cl., 2 q.h.)

A study of the history of x-rays; medical terminology; nursing and dental procedures pertinent to radiologic technology. *Prereq.* none.

86.621 Radiologic Technology Orientation II (2 cl., 2 q.h.)

A study of pediatrics and proper methods of immobilizing infants. Necessity for standardizing radiographic exposures to protect the patient. Medical and surgical diseases and the effects they cause on anatomy and physiology and the radiograph. *Prereq.* 86.620.

86.622 Radiological Science I (4 cl., 4 q.h.)

A survey of the basic concepts of physics; units of measurement; Newton's law of motion; work; energy; atomic theory of matter; electric currents; magnetism; generators; motors; production and control of high voltage. *Prereq.* none.

86.623 Radiological Science II (4 cl., 4 q.h.)

Interaction of X-rays and matter; nature and production of X-rays, radioactivity; properties of lightwaves; optics; heat transfer and wave motion; dosimetry; X-ray circuits and tubes. *Prereq.* 86.622.

86.624 Principles of Radiology I (4 cl., 4 q.h.)

Chemistry used to process radiographic films; uses of each chemical. A study of the planes of the body; basic positioning of the skeletal system and more detailed positions utilized to demonstrate anatomical parts to best advantage. *Prereq.* none.

86.625 Principles of Radiology II (4 cl., 4 q.h.)

Organization factors of hospitals; financial consideration; legal considerations; proper care and maintenance of x-ray equipment; test equipment necessary; special procedures used in radiology and indications for doing them. *Prereq.* 86.624.

86.626 Radiologic Photography and Exposure I (4 cl., 4 q.h.)

A study of contrast materials used to visualize areas and organs of the body; basic principles of image formation; electromagnetic spectrum; circuits used in radiology; X-Ray tube construction; factors controlling radiographic quality. *Prereq.* none.

86.627 Radiologic Photography and Exposure II (4 cl., 4 q.h.)

Accessory items used to improve radiographic quality; methods of protection for patients and personnel. Effects of radiation on cells and tissue, malignant and benign; therapy planning and treatment; uses of radioactive nuclides for diagnosis and treatment. *Prereq.* 86.626.

86.647. Radiology Practicum (12 q.h.) (Formerly 86.628 & 86.629)

Application of theoretical principles presented at the University by performing radiographic procedures under supervision. Assigned homework to be part of lesson plans received while at the hospital, and lectures presented at the hospital and the university. A.M.A. requirement minimum 2 hrs/week.

Courses open to students in Medical Laboratory Science Programs.

87.540 Seminar in Medical Technology (2 cl., 2 q.h.) (formerly 18.529)

Current topics in medical technology. Required readings and presentations by students. Guest lecturers. *Prereq. instructor permission.*

87.541 Hematology I (1 cl., 3 lab., 2 q.h.) (formerly 18.341)

Basic hematological techniques including discussion of the differential smear and observation of the normal morphology of human red cells, white cells, and platelets. *Prereq. 18.512 or equiv. (Laboratory fee)*

87.542 Hematology II (1 cl., 3 lab., 2 q.h.) (formerly 18.342)

Morphologic and etiologic classification of the anemias. Related diagnostic tests will be discussed. *Prereq. 18.541 or equiv. (Laboratory fee)*

87.543 Hematology III (1 cl., 3 lab., 2 q.h.) (formerly 18.343)

Studies of pathologic and physiologic deviations of the white cell series as observed in leukemias and infections. Some animal hematology will be included. *Prereq. 18.542 or equiv. (Laboratory fee)*

87.544 Epidemiology I (2 q.h.)

Basic concepts in epidemiology. Causes of disease. Factors contributed by agent, the human host, and the environment. Illustrated by case studies.

87.545 Epidemiology II (2 q.h.)

Acquisition and evaluation of data in epidemiology. Relationships of person, time, and place. Case studies and problems.

87.546 Medical Laboratory Science Education Seminar (2 q.h.)

A series of seminars designed to prepare the practicing technologist for effective clinical instruction.

87.547 Medical Laboratory Science Administration Seminar (2 q.h.)

A presentation of the principles of personnel and laboratory management, medical and legal aspects of medical technology, and quality control.

87.508 Introduction to Cytotechnology (2 cl., 2 q.h.)

A review of cell structure, principles of microscopy, and staining techniques. Anatomy and physiology of the female reproduction system and study of the non-malignant cytology of the female genital tract. *Prereq. 18.132 or equivalent. (Laboratory fee)*

***87.518 Applied Cytology I (At Hospital, 4 q.h.)**

The microscopic evaluation and screening of benign cytological smears and smears from cervical dysplasia, carcinoma-in-situ, invasive squamous cell carcinoma and adenocarcinoma, and invasive malignant tumors of the female genital tract.

*Available only to students enrolled in the 12-month professional cytology program.

87.528 Cytopathology I (2 cl., 2 q.h.)

Cytopathology and clinical aspects of cervical dysplasia, carcinoma-in-situ, and invasive squamous cell carcinoma. Consideration of endometrial and endocervical carcinoma, other genital tract cancers and radiation effect. *Prereq.* 87.508. (Laboratory fee)

87.538 Cytopathology II (2 cl., 2 q.h.)

Benign and malignant cytology of the respiratory and gastrointestinal systems correlated with the anatomy and physiology. Considerations of clinical aspects. Special collection techniques. Emphasis on cancer of the lung and stomach. *Prereq.* 87.528. (Laboratory fee)

***87.548 Applied Cytology II** (At Hospital, 4 q.h.)

The microscopic evaluation and screening of cytological smears from the respiratory tract, gastrointestinal tract, urinary tract, and from body fluids. Continuing evaluation of Cytological smears from the gynecological tract.

87.558 Cytopathology III (2 cl., 2 q.h.)

Study of benign, atypical and malignant cells exfoliated from various portions of the urinary tract, in serious effusions, cerebrospinal fluid, and breast secretions. *Prereq.* 87.528. (Laboratory fee)

87.568 Cytogenetics and New Concepts (2 cl., 2 q.h.)

Clinical and cytological aspects of genetics, including genetic counseling. Special uses of cytology. Cell research techniques, cancer. Epidemiology, and current concepts related to cytotechnology. *Prereq.* 87.558 or permission of instructor. (Laboratory fee)

***87.578 Applied Cytology III** (At Hospital, 4 q.h.)

The microscopic evaluation and screening of cytological smears from all parts of the body. Practical experience in genetic cytology.

87.588 Cytopathology Seminar.

Advanced course for students in baccalaureate degree program. Discussion of pertinent journal reports, new methodologies, and research. *Prereq.* *Permission of instructor.*

87.598 Special Topics (2 cl., 2 q.h.)

Special projects in cytology, cytopathology, or cytotechnology investigated or reviewed and reported by student. Written and oral presentation required. *Prereq.* 87.558 or permission of instructor.

87.608 Seminar: Cytopathology — Criteria and Correlations (4 cl., 2 q.h.)

Presentation, discussion, and interpretation of benign, suspicious, and hormonal conditions. The cytological diagnostic criteria of malignant tumors from various body sites and their histopathological correlation.

***87.618 Applied Cytology IV** (2 q.h.) (at hospital)

The microscopic evaluation and screening of cytological smears from various body sites. Effects of radiation and of chemotherapy; diagnosis of suspicious and hormonal conditions; cytological observations in pregnancy; and the clinical significance of these.

*Available only to students enrolled in the 12-month professional cytology program.

94—LAW ENFORCEMENT

94.505 Human Rights in Corrections (2 q.h.)

Consideration of the special practices and problems in the protection of human rights in the institutional environment; legal and practical aspects.

94.506 Basic Statistics in Law Enforcement (2 q.h.)

Introduction to basic statistical information procedures and operations relating to law enforcement areas; interpretation of criminal statistics; crime rates; unrecognized crime; non-reporting; recidivists' rates; individual statistics; evaluation of records; research and data on specialized services.

94.507 Correctional Counseling (2 q.h.)

Basic concepts and principles of counseling; individual and group therapy carried on in the correctional field and institutional services; case study and projects.

94.508 Criminal Investigation and Case Preparation I (2 q.h.)

General investigation techniques; collection and preservation of evidence and information; consideration of particular crimes, including arson, sexual offenses, larceny, burglary, robbery, forgery, and homicide.

94.509 Criminal Investigation and Case Preparation II (2 q.h.)

Conduct of raids; surveillance and undercover operations; methods of preparing a case for court; specialized scientific methods; exercises involving techniques of prosecution and cross-examination. *Prereq.* 94.508.

94.512 Comparative Police Systems (2 q.h.)

A study of existing police systems in other jurisdictions; examination of the organization, administration and practices in police agencies in the United States, Europe, and the United Kingdom.

94.513 Introduction to Industrial Security (2 q.h.)

The historical, philosophical, and legal basis of security; a survey of administrative, personnel, and physical aspects of the security field.

94.514 Interviews and Interrogations I (Formerly Police Interrogation I.) (2 q.h.)

Interviewing of victims, witnesses, informants, and complainants; demonstration, study, discussion, and practice of techniques and procedures.

94.515 Interviews and Interrogations II (Formerly Police Interrogation II.) (2 q.h.)

Techniques for legally acceptable questioning of suspects and persons in custody; laws governing interrogation practices; demonstrations, class exercises and assigned projects. *Prereq.* 94.514.

94.516 Security Administration (2 q.h.)

Administration, organization and operations of security and protection units; personnel selection; relationships of business and industry with governmental units.

94.517 Advanced Correctional Practices I (2 q.h.)

Diagnosis and treatment of the drug addict and the alcoholic offender at both juvenile and adult levels; a study of these and related kinds of personal self-abuse as to causation and treatment. *Prereq.* 94.553.

94.518 Advanced Correctional Practices II (2 q.h.)

Case studies of persons confined as to their past and present environment and relationships; consideration of purposeful resolves or regressions. *Prereq.* 94.517.

94.519 Advanced Correctional Practices III (2 q.h.)

Evaluation of correction-psychiatric facilities for the disordered offender, including the aggressive, the assaultive, and the violent subject. *Prereq.* 94.518.

94.520 Traffic Safety and Control I (2 q.h.) (Formerly titled Traffic Law Enforcement I.)

A study of the state of the art of highway safety; research; traffic accident investigation; prevention; rescue; automated system of vehicular traffic accident and moving violation data collection; analysis and utilization; speed control; speed zoning techniques; radar; vascar; laws, rules, and regulations.

94.521 Traffic Safety and Control II (2 q.h.) (Formerly titled Traffic Law Enforcement II.)

An in-depth study of traffic law enforcement, techniques of selective enforcement; traffic surveys; engineering, safety education, and evaluation of current traffic programs. *Prereq.* 94.520.

94.523 The Law and Institutional Treatment (2 q.h.)

The process of law from arrest of offender through release in its relation to correctional principles and practices; functions of police, defense, prosecution, and courts; legal documents related to commitment.

94.524 Comparative Correctional Systems (2 q.h.)

A study of correctional systems and methods in selected jurisdictions; examination of the organization, administration, and practices in United States and foreign countries.

94.525 Law Enforcement Identification and Records I (2 q.h.)

Records and systems and utilization; survey of forms, files, procedures, standards and uniformity; concentration of theoretical and practical applications.

94.526 Law Enforcement Identification and Records II (2 q.h.)

Theories and practices in personal identification principles; survey and evaluation of present and new identification techniques; historical and legal consideration of identification and record data. *Prereq.* 94.525.

94.530 Police Public Relations (2 q.h.)

The principles of sound public relations for the entire police operation; writing, public speaking, conferences, and all news media; consideration of police image and public opinion.

94.531 Police Community Relations (2 q.h.)

A survey of the role and function of police in intergroup relations; human relations and minority groups; responsibilities of police with civil rights, civil disorders, and public protection.

94.532 Research Methods in Criminal Justice (2 q.h.)

A research project related to some specific police or correctional interest or operation, in consultation with the faculty adviser. Course meets at discretion of the instructor. Project paper required for grade.

94.536 The Patrol Function I (Formerly Police Patrol I.) (2 q.h.)

The planning process related to the administration of the patrol function. Consideration of theoretical and operational aspects of various patrol systems; random patrol, response force, split force, team policing, probability theory, and the relationship between patrol and crime levels.

94.537 The Patrol Function II (Formerly Police Patrol II.) (2 q.h.)

A continuation of 94.536 with emphasis upon the goals and objectives of police patrol management models. Discussion and analysis of manpower, work load, response time, patrol communications, preventive strategies, and inputs and outputs of patrol systems evaluated in quantitative form. *Prereq.* 94.536.

94.541 Introduction to Criminalistics I (2 q.h.)

A survey of the elements of microscopy, spectroscopy, and chemistry as applied to trace evidence in criminal investigations; responsibilities of technician, investigator, and others.

94.542 Introduction to Criminalistics II (2 q.h.)

Toxicology and serology; procedures related to other physical evidence; laboratory demonstrations and practical exercises. *Prereq.* 94.541.

94.544 The American Correctional System (2 q.h.)

A critical survey of the correctional field covering probation, institutions, and parole as to historical development, program content, and current problems and needs.

94.546 Social Deviance I (2 q.h.)

A consideration of the social problems of social disorganization, mental disorders, drug addiction, alcoholism, suicide, and sexual behavior.

94.547 Social Deviance II (2 q.h.)

Continuing consideration of world's population crisis, race and ethnic relations, family disorganization, work and automation, poverty and disrepute, war and disarmament. *Prereq.* 94.546.

94.549 Treatment of Offenders I (2 q.h.)

The concept of treatment and corrections; history; classification; training, education and guidance; treatment methods; inmate society; health and social services.

94.550 Treatment of Offenders II (2 q.h.)

Therapy, psychiatric and psychological considerations, case studies, evaluation of comparable methods. *Prereq.* 94.549.

94.551 Correctional Administration I (2 q.h.)

Correctional processes and services, standards, personnel and principles of management; allocation of resources, training of staff.

94.552 Correctional Administration II (2 q.h.)

Study of regular and special programs, volunteers, outside contacts, sentence reduction, discharge planning, work release administration.

94.553 Correctional Administration III (2 q.h.)

Types of institutions; compacts; regional concepts; planning, organizing, controlling, and directing corrections; budgeting. *Prereq.* 94.552.

94.557 Investigative Report Writing (2 q.h.)

Report content and writing, exercises in accurate terminology and concise reporting, interpretation and evaluation of information, practical report-writing projects.

94.560 Police Supervision (2 q.h.)

The police supervisor's role in discipline; interdepartmental relations; problem handling and personnel policies; problems in supervisory relationships; wages, grievances, morale, and safety.

94.561 Police Work with Juveniles (2 q.h.) (Formerly titled Police Juvenile Methods)

The role of the police in delinquency prevention with emphasis on theory, administration, control, treatment, confinement, community resources, and relationships with the public and the juvenile court.

94.563 Criminology I (2 q.h.)

An introduction to the study of crime from the perspective of classical and contemporary criminological theories. In particular, attention is given to biological, psychological and sociological approaches to the explanation of crime.

94.564 Criminology II (2 q.h.)

A continuation of Criminology I with emphasis on the causes of crime and the relationship between law and crime. Specific implications of prevention, rehabilitation and treatment are considered in depth. *Prereq.* 94.563.

94.565 Delinquency Prevention (2 q.h.)

A survey of delinquent behavior, causation, and delinquency prevention programs; seminar projects for discussion of specific problems and general principles in establishing delinquency prevention services.

94.567 Probation and Parole Practices I (2 q.h.)

The probation officer; presentence investigation; conditions of probation; effectiveness, administrative aspects and prediction methods; relationship to community.

94.568 Probation and Parole Practices II (2 q.h.)

The parole officer; conditions of parole; supervision; effectiveness; administrative relationships; relationships to community, court and law enforcement agencies; relationships of probationer and parolee to rehabilitative, social, and family services; consideration of recidivism; aftercare.

94.571 Law Enforcement Management and Planning I (2 q.h.)

Philosophy and theories of management in law enforcement; studies of organization from the administrator's viewpoint, including control, efficiency, effectiveness, and discipline.

94.572 Law Enforcement Management and Planning II (2 q.h.)

A survey of the administrator's role, including special activities and responsibilities; administrative planning; civilian personnel, including recruitment, selection, evaluation; training; budgets; management records; interpersonal communications; auxiliary services; evaluation of present and future management systems. *Prereq.* 94.571.

94.574 Juvenile Corrections I (2 q.h.)

A study of police, detention, petition, and hearings related to juveniles; juvenile court procedures, philosophy, and terminology; adjudication.

94.575 Juvenile Corrections II (2 q.h.)

Social workers, probation officers, judges, psychologists, and psychiatrists with relation to juveniles; institutions; aftercare; prevention. *Prereq.* 94.574.

94.577 Government Security Programs I (2 q.h.)

Department of Defense security programs; applicable federal statutes and executive orders; visitor control.

94.578 Government Security Programs II (2 q.h.)

Security clearances under appropriate federal directives; handling classified information; automatic time-phased downgrading and declassification.

94.579 Government Security Programs III (2 q.h.)

Relations with subcontractors, vendors, and suppliers; the protection of proprietary information; legal and practical protection of sensitive data. *Prereq.* 94.578.

94.582 Document Control (2 q.h.)

A detailed study of procedures for handling and control of classified and other sensitive information; a survey of control systems from manual to semi-automated systems using data processing equipment.

94.583 Industrial Fire Prevention (2 q.h.)

Principles and practices of fire safety, including organization and management responsibility, property conservation, safeguards for construction, fire control apparatus and functions, engineering and scientific data on fires and related perils.

94.584 Physical Security I (Formerly Plant Protection I.) (2 q.h.)

The basic foundations for security in industry, banking, transportation, utilities, and other nongoverning operations; physical requirements and standards.

94.585 Physical Security II (Formerly Plant Protection II.) (2 q.h.)

Implementation of security; study of inanimate aspects, including alarm and surveillance devices; study of animate aspects of protection. *Prereq.* 94.584.

94.586 Retail Security (2 q.h.)

The operation of security departments including functions of mercantile establishments; dishonest employees; shoplifters; management and public relations; receiving, shipping, and warehousing; special laws and procedures.

94.587 Bank Security Measures (2 q.h.)

(Formerly Security Measures for Financial Institutions.)

An in-depth study of the principles and practices of security measures for banks and other financial institutions and the preparation of rules establishing minimum standards under current federal and state legislation.

94.591 Seminar in Security (2 q.h.)

(Formerly Seminar in Industrial Security.)

An analysis of current problems in security such as growth patterns, salary structures, training and education, existing weaknesses; field trips, individual study assignments, and required oral and written reports.

94.593 Seminar in Correctional Practices (2 q.h.)

(Formerly Seminar in Correctional Program Management.)

An analysis of current problems in corrections designed to meet the needs and interests of specific groups of students, practitioners, supervisors, and administrators of correctional programs.

94.595 The National Law Enforcement Seminar (3 q.h.)

An annual, concentrated exploration of current viewpoints, varied solutions, innovative procedures, and critical analyses in the issues facing law enforcement, correctional practices, and security, drawing on exceptionally qualified local and national figures. A research paper under the direction of a faculty adviser is required for credit. *Open to L.E. majors & Crim. Just. Personnel only.*

94.596 Hospital Security (2 q.h.)

The function of protection in the health industry; medical security administration including study of health care providers; trends in hospital law; security from injury, fire and loss in the medical world; security methodology for safeguarding specialty areas; the security role in mass casualty management and emergency preparedness; the concept of professionalism; community liaison; and patient attitudes toward security.

94.597 Current Security Problems (2 q.h.)

An analysis of special problem areas such as security education and training, community relations, white-collar crime, drug abuse, theft control, shoplifting, document control, subversion and sabotage, protection of classified information, control of proprietary information and business espionage, labor problems, civil disturbances, and natural and man-made disasters.

94.601 Law Enforcement Math I (Formerly Seminar in Law Enforcement 94.590.) (2 q.h.)

A review of elementary algebra: algebraic expressions and operations, equations, word problems. Solutions to mathematical problems in connection with their practical applications in law enforcement.

94.602 Law Enforcement Math II (2 q.h.)

Further review: fundamental operations, measurement and computation, solutions of linear and quadratic equations. Probability, trigonometry, statistics, ratio and proportion. *Prereq.* 94.601.

94.603 Law Enforcement Math III (2 q.h.)

Methods and applications of algebra: analytic geometry, equations of motion and energy, permutations, combinations. Stress is on problem-solving more than theory. Application of these principles are applied to most areas of law enforcement. *Prereq.* 94.602.

94.604 Seminar in Law Enforcement (Youth Crime Control) (2 q.h.)

The criminality and deviance of those between the juvenile and adult age. Consideration is given to: concepts and characteristics of the youthful offender; the role of the family in youth crime; the generation gap; violence of youth hooliganism; drug addiction of youth; ordinary crimes of youth; the youth sub-culture and culture conflict; the role of mass media and education in youth crime; the concepts of freedom and justice in the youth culture; treatment of youthful offenders; and the state of youth crime control in foreign countries.

94.605 Seminar in Law Enforcement (Victimology) (2 q.h.)

Criminal-victim relationships, with emphasis on victim precipitated crimes and compensation to the victims. Consideration is given to: concept and significance of "victimology;" time, space, sex, age, and occupational factors in criminal-victim relationships; victims of murder, rape, other violent crimes, and property crimes; victim-typology; the public as victim; restitution to victims of crime; compensation to victims of crime; and the functional responsibility of the victim.

94.606 Seminar in Law Enforcement (International Crime Control) (2 q.h.)

Crimes touching upon more than one country, with emphasis on international criminal law principles, treason, and espionage. Concentration is given to: the concept of law in its comparative aspects; customs; treaties; international conventions; "comity;" culture conflicts; the "international personality;" the "attempt clause;" the Belgian approach; the Oxford approach; asylum, extradition; international ordinary criminals; political criminals; piracy (on sea and in the air); war criminals; genocide; international courts; League of Nations; United Nations; international criminal statistics; Interpol, the Soviet-type spy-schools; the history of American Intelligence.

94.607 Seminar in Law Enforcement (Grantsmanship) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

This seminar is designed to familiarize the participants with the orderly sequence of organizational steps required in providing the institutional framework necessary for preparation and submission of applications to granting agencies. Major topics include: Omnibus Crime Control and Safe Streets Act of 1968; functions of the Law Enforcement Assistance Administration; grant application strategy, planning and research.

94.608 Seminar in Law Enforcement (Law Enforcement Operational Intelligence) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

Designed to provide a theoretical understanding of the value and function of an

intelligence unit, including planning, directing, organizing, financing, and other salient features of the administration of these units. Emphasis is placed on organized crime, subversive activities, and liaison programs as they apply to a modern police agency.

94.609 Independent Studies (2 q.h.)

Faculty guided research in individually selected topics relating to the criminal justice system.

94.610 Seminar in Law Enforcement (Collective Bargaining) (2 q.h.) (Formerly titled Seminar in Law Enforcement 94.590.)

The history and background of collective bargaining in the public sector as it affects members of the law enforcement field; initial establishment of rights of labor, labor legislation—federal and state; preparation for negotiation, resolutions of impasses, final agreement and operation of the contract.

94.611 Man, Law, and Society I (2 q.h.)

Designed to help the student to improve his capacity to handle problems in the many institutions and sociological processes of the American legal system, and to see these problems in the perspective of their everyday working interrelationships, in order to heighten his awareness of those aspects of familiar and often unnoticed legal problems which call for a perceptive understanding of the functions of the various institutions involved.

94.612 Man, Law, and Society II (2 q.h.)

A general analysis of the way in which major changes occur in the established practices of legal and social organizations and communities. Particularly concerned with the part played by legal institutions in initiating, controlling, and directing or assisting such changes.

94.613 Man, Law, and Society III (2 q.h.)

An introduction to the social science concepts and methods in their current and potential application to social and legal problems. Aims to acquaint the student with a variety of social research concepts and methods of special utility in investigating diverse types of social law related problems.

94.614 Seminar in Law Enforcement (Interviewing Practicum) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

Advanced interrogation methods and procedures; techniques of persuasion; conditioning (negative and positive); the polygraph, its history and methodology; the established rules and procedures required for current diagnosis of truth and deception; the evaluation of the contemporary methods of international law enforcement agencies. *Prereq.* 94.515.

94.615 Seminar in Law Enforcement (Organized Crime) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

The nature and problems of organized crime; causes and effects; comparative and historic roots; the activities, organization, and economics; possible solutions—the scope and techniques in combating organized crime.

94.616 Seminar in Law Enforcement (Minorities and the Urban Crisis) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

An investigation of the ethnic and racial origins and characteristics of the American people; the interaction, conflicts, and possibilities of adjustment between the dominant society and minority groups—particularly in contemporary urban settings, and the role and function of police in their inter-relationship with minority groups.

94.617 Seminar in Law Enforcement (Criminal Behavior) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

An examination of crime and criminal behavior as a social phenomenon. Three principal divisions; sociology of law and its effect; criminal etiology and the scientific analysis of the causes of crime; evaluation of the various rationals of detention as a crime control factor.

94.618 Seminar in Law Enforcement (Prosecutive Development) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590). Prereq. 94.502, 94.504, 94.509.

Lecture and discussion relating the professional requirements of the modern police officer in the United States; oral testimony; the entire corpus delicti and all other related matters in proper form and sequence; the trial; testimony and the jury; conduct on the witness stand; opposition counsel; the defense of entrapment; opinion testimony; confessions; prospective witnesses; legal standards and the police. Prereq. 94.501, 94.504, 94.510.

94.619 Seminar in Law Enforcement (Forensic Laboratory) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

Crime laboratory organization and the utilization of special equipment for the analysis interpretation, classification, and identification of physical evidence obtained in crime scene searches. The transportation, storage, and security of physical evidence and the effect of the results, coupled with the preparation of exhibits for courtroom presentation. Prereq. 94.542. (Laboratory fee)

94.620 Seminar in Law Enforcement (Intervention Strategies and Tactics for Law Enforcement — Counseling Techniques) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

Basic concepts and principles of intervention as a social work method. Nature of therapeutic relationships, principles of communication. Diagnostic assessment of the person-problem-situation configuration. Goal-setting process. Ego supportive procedures and use of community resources.

94.621 Civil-Liberties and the Police I (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

An in-depth preparation for the officer facing the practical problems of enforcing the law without breaching the civil rights of the accused and bystanders; individual readings, lectures, group discussions, and preparations from Massachusetts and national interest cases; many incidents pertinent to the actions of the men involved with these problems will be investigated and studied; constitutional interpretation and limitations are the guidelines for the course.

94.622 Civil Liberties and the Police II (2 q.h.)

Several Supreme Court cases are followed from the time of the call, to the confrontation, arrest, examination in court, appeals, and the direct statements on the problem by jurists of the highest courts. The last section of the term ties in the latest criminal law and civil rights act changes including—but not limited to—the criminal justice and no knock laws and the latest Civil Rights Act provisions. *Prereq.* 94.621.

94.623 Seminar in Law Enforcement (Drugs) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

Designed to meet the needs of law enforcement personnel in the problematic area of drug abuse; the law, society classification, distribution, identification, and the effects of drugs.

94.624 Seminar in Law Enforcement (Executive Development) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

The role of the police administrator within the managerial structure. Special problems unique to the law enforcement executive, decision making, policy formation, planning, controlling, communicating, and directing. A consideration of case studies and surveys will be utilized.

94.625 Seminar in Law Enforcement (Mental Health and the Police) (2 q.h.) (Formerly Seminar in Law Enforcement 94.590.)

A study of the roles of law enforcement and mental health services. Diagnosis of the triggering mechanisms of behavioral disorders and the suicidal phenomenon; psychiatric and psychological considerations; case studies and the legal process.

94.626 Seminar in Law Enforcement (Data Processing) (Formerly Seminar in Law Enforcement 94.590.)

An introduction to automated systems utilized in the field of law enforcement; basic program concepts; filing and sorting techniques; available input and output storage media; types and sources of data communications and applications.

94.627 Administration of Justice I (2 q.h.) (Formerly 94.501.)

A survey of the evaluation of justice from the earliest times, developed historically, with particular emphasis on Western justice and American justice, including the roles played by the judiciary, with stress on due process and the constitutional guarantees.

94.628 Administration of Justice II (2 q.h.)

An analysis of the various groups and professions in the American justice system. Emphasis is fixed on human relations, efficiency, current trends and the future role of the American criminal justice system. *Prereq.* 94.627.

94.629 Civil Law in Criminal Justice I (2 q.h.) (Formerly 94.511.)

Civil matters such as defamation, negligence, assault and battery, false confinement, trespass, conversion, and agency relationships.

94.630 Civil Law in Criminal Justice II (2 q.h.)

Civil matters such as the law of contracts, bailments, domestic relations and business relationships which should be known to and distinguished by law enforcement personnel. *Prereq.* 94.629.

94.631 Criminal Law I (2 q.h.)

Exploration of the major problems of criminal law as a device for controlling socially undesirable behavior. It is intended to give one a working knowledge of the basic questions of public policy involved in the administration of criminal justice and the legal principles of determining criminal liability. Course includes a consideration of specific crimes, elements of a crime, parties to a crime, and defenses to a crime.

94.632 Criminal Law II (2 q.h.)

Consideration of vital constitutional and statutory concepts, including self-incrimination, search and seizure, law of arrest, criminal procedure and responsibility, confessions, right to counsel, and conduct of trial in the District, Superior, Appellate and Federal Courts. *Prereq.* 94.631.

94.633 Evidence and Court Procedure I (2 q.h.)

Rules of evidence; principles of exclusion; evaluation and examination of evidence and proof.

94.634 Evidence and Court Procedure II (2 q.h.)

Competency, consideration of witnesses, laws of search and seizure, court procedures, moot court exercises. *Prereq.* 94.633.

94.650 Fire Investigation and Arson I (2 q.h.)

A study of the elementary chemistry of combustion involving sources of ignition, fuels, the nature and behavior of gases and their toxicity. The combustion properties of non-solid fuels as opposed to the combustion properties of solid fuels are considered. Also consideration is given to explosions associated with fires. A discussion of the socio-economic aspects of fire including the pyromaniac and his physiological and psychological involvement.

94.651 Fire Investigation and Arson II (2 q.h.)

A more concentrated approach is taken in dealing with the fire bug and his sociological orientation. A discussion of carbon, hydrogen, and oxygen as major elements in all fires and the flameless ignition effect. Methods of fire proofing are also considered and references made to various types of building materials as well as the role of pyrolysis. Fire patterns of structural fires and asphyxiation along with the legal aspects of arson are also considered. *Prereq.* 94.650.

94.652 Law Enforcement Fiscal Management

The various budgeting systems and their application to law enforcement organizations including: the line item budget, programmed budget, performance budget, and the planned programmed budget system; development of sound fiscal policy; appropriation of funds; tax base revenue systems; distribution of public monies; budget request, expenditures, and auditing procedures.

94.653 Massachusetts Criminal Law

A comprehensive study of Massachusetts Criminal Law and its application by law enforcement officers. Areas of study include: Common Law, Criminal Statutes, Annotated Laws, Criminal Case Law, Supreme Court Decisions, and Motor Vehicle Law.

94.658 Alcohol Problems in Law Enforcement

Acquaints students with the current state of knowledge on society, culture, and drinking patterns; the variety of alcohol problems that confront peace officers; discussion of the range of solutions available.

94.697 Honors Program I (4 q.h.)

Prereq. Approval of the Dean.

94.698 Honors Program II (4 q.h.)

Prereq. 94.697.

94.699 Honors Program III (4 q.h.)

Prereq. 94.698.

INTENSIVE COURSES

The following are intensive courses. Please refer to the combination numbers for the individual course description previously listed in this catalog.

97.500 Administration of Justice (Intensive) (4 q.h.)

Combination of 94.627 and 94.628.

97.501 Criminal Law (Intensive) (4 q.h.)

Combination of 94.631 and 94.632.

97.502 Evidence and Court Procedure (Intensive) (4 q.h.)

Combination of 94.633 and 94.634.

97.503 Civil Law in Criminal Justice (Intensive) (4 q.h.)

Combination of 94.629 and 94.630.

97.504 Civil Liberties and the Police (Intensive) (4 q.h.)

Combination of 94.621 and 94.622.

97.505 Interviews and Interrogations (Intensive) (4 q.h.)

Combination of 94.514 and 94.515.

97.506 Traffic Law Enforcement (Intensive) (4 q.h.)

Combination of 94.520 and 94.521.

97.507 Law Enforcement Identification and Records (Intensive) (4 q.h.)

Combination of 94.525 and 94.526.

97.508 Introduction to Criminalistics (Intensive) (4 q.h.)

Combination of 94.541 and 94.542.

97.509 Social Deviance (Intensive) (4 q.h.)

Combination of 94.546 and 94.547.

97.510 Law Enforcement Management Planning (Intensive) (4 q.h.)

Combination of 94.571 and 94.572.

97.511 The Patrol Function (Intensive) (4 q.h.)

Combination of 94.536 and 94.537.

97.512 Criminal Investigation and Case Preparation (Intensive) (4 q.h.)

Combination of 94.508 and 94.509.

97.513 Criminology (Intensive) (4 q.h.)

Combination of 94.563 and 94.564.

97.514 Treatment of Offenders (Intensive) (4 q.h.)

Combination of 94.549 and 94.550.

97.515 Probation and Parole Practices (Intensive) (4 q.h.)

Combination of 94.567 and 94.568.

97.516 Fire Investigation and Arson (Intensive) (4 q.h.)

Combination of 94.650 and 94.651.

97.517 Advanced Correctional Practices (Intensive) (6 q.h.)

Combination of 94.517, 94.518, 94.519.

97.518 Correctional Administration (Intensive) (6 q.h.)

Combination of 94.551, 94.552, 94.553.

97.519 Law Enforcement Mathematics (Intensive) (6 q.h.)

Combination of 94.601, 94.602, 94.603.

97.520 Government Security Programs (Intensive) (6 q.h.)

Combination of 94.577, 94.578, 94.579.

97.521 Man, Law and Society (Intensive) (6 q.h.)

Combination of 94.611, 94.612, 94.613.





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- Daniel D. Glatthorn, B.S., M.B.A.
Industrial Management
Boston Naval Shipyard
- L. James Glinos, B.B.A., Ed.M.
Human Relations
Kinnecott Copper Corp.
- Myer Goldberg, B.S.
Law Enforcement
M.D.C. Police
- Robert L. Goldberg, A.B., M.B.A., C.L.U.
Management
John Hancock Mutual Life Insurance Co.
- M. Patricia Golden, B.S., M.A., Ph.D.
Sociology
Northeastern University
- Renee V. Golden, B.A., M.A.
Modern Languages
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Labor Management Relations
Attorney at Law
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Modern Languages
Quincy High School
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Psychology
- Maureen A. Goldman, B.A., M.A.
English
- Minton F. Goldman, B.A., M.A., MALD, Ph.D.
Political Science Major Advisor
Northeastern University
- Stan Goldman, B.S., M.A.
Political Science
- Arnold S. Goldstein, B.S., M.B.A., J.D.
Health Science
Northeastern University
- Harold M. Goldstein, A.B., M.A., Ph.D.
Economics
Associate Consultant

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Accounting
Consultant
Northeastern University
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Northeastern Essex Mental
Health Center
- Judith R. Goodman, B.A., M.A.
English
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- Leon M. Goodman, B.B.A., M.B.A.
Human Relations
Wage & Salary Administration
New England Tel & Tel Co.
- Stephen Goodyear, A.B., M.A.
Modern Languages
Hull High School
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Northeastern University
- Daniel D. Gordon, B.A., M.A.
Economics
Salem State College
- Lester I. Gordon, A.B., M.A.
History
Boston University
- Mary Jane Gorton, B.A., Ed.M.
Fine Arts
- Daniel Z. Gould, B.S., M.B.A.
Industrial Management
Fenwel Electronics, Inc.
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English
Lasell Jr. College
- Daniel A. Grady, B.S.B.A., M.B.A.
Accounting
William Underwood Co.
- *William Grady, B.B.A.
Quality Control
Courier-Citizen Printing
Company
- Anthony P. Graffeo, B.A.
Chemistry
Northeastern University
- Robert L. Graham, Jr., B.S.B.A., M.B.A.
Management Decisions &
Policies
Lybrand, Ross Bros. &
Montgomery
- Leon S. Graubard, A.B., A.M.
Economics
Northeastern University
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Law Enforcement
- Kristo Gregory, B.S.
Investments
Paine, Webber, Jackson, &
Curtis
- Gerald R. Griffin, B.A., M.A., Ph.D.
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Northeastern University
- John L. Griffith, B.S.
Management & Organization
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- Director of Planning, Town of
Braintree
- Joseph Grimaldi, B.A., M.A.
History
First National Bank of Boston
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Northeastern University
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Industrial Management
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Commonwealth of Mass.
Dept. of Mental Health
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Transaction Technology, Inc.
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Johnson & Higgins
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Raytheon
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Spanish
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Psychology
Northeastern University
- Reginald Hachey, B.M., M.M., A.D.
Music
Northeastern University
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Philosophy
Northeastern University
- Robert Haddad, M.B.A., C.P.A.
Accounting
Price Waterhouse Co.
- John E. Haddon, B.S., M.A.
Law Enforcement
Upper Cape Police Compact
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Accounting
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Chemistry
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Raytheon
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Masconomet Regional High
School-Boxford
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Drexel, Burnham & Co., Inc.
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Keane Associates, Inc.
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Harvard Medical School—
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Abuse (NIAAA)
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Gillette Co.
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Northeastern University
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M.I.T.
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General Electric
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Chemistry
Northeastern University
- A. Karim Khudairi, B.Sc., Ph.D.
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Northeastern University
- William F. Kidney, A.B., LL.D.
Law Enforcement
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Marketing
Nashua Corp.
- Kernan F. King, A.B., J.D., LL.M., C.L.U.
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New England Mutual Life
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Consultant
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Commercial Insurance Co.
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English
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Small Business
Gillette
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Children's Hospital Medical
Center
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Operations Research
Polaroid
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Electronic Data Processing
- *Donald J. Kramer, B.S.B.A., M.B.A.
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Medicon Corp.
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Economics
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Economics
Northeastern University
- Ernest A. Kraus
Therapeutic Recreation
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Widett & Widett
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Newton College
- Robert M. Krim, B.A., M.A.
History
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Economics
Jordan Marsh Company
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Parks, Cramer Co.
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Physical Distribution
Management
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Accounting
Massasoit Community College
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Chemistry
AVCO
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Systems
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Law Enforcement
Revere Police Dept.
Pass & Leach
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Insurance
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C. S. Draper Lab, Inc.
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Consultant
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Speech
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for Educational T.V.
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Speech
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John Hancock Insurance
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Psychology
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Ware Associates
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Gillette
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Cabot Corp.
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Northeastern University
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Stone & Webster
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R.C.A.
- Thomas J. Maguire, LL.B.
Law Enforcement
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Connell & Mahoney
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Stoneham Public Schools
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Matson Personnel
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Personnel Placement &
Human Relations
Management Consultant
- *Paul V. Mulkern, A.B., M.S.
Personnel & Industrial
Relations
U.S. Bureau of Labor
Statistics
- Edmund J. Mullen, B.A., M.Ed.
Law Enforcement
Northeastern University
- Francis E. Mullen, A.A., A.S., B.S.
Law Enforcement
Northeastern University
- *Joseph A. Mullen, B.B.A., M.B.A.
Management
Consultant—Management
- James F. Murphy, B.S.
Law Enforcement
Governor's Commission on
Crime & Correction
- Martin A. Murphy, A.S., B.S.
Law Enforcement
Mass. State Police
- Paul J. Murphy, B.S., M.B.A.
Organizational Management
G.E.
- A. Howard Myers, A.B., M.A., Ph.D.
Industrial Relations—
Consultant
Northeastern University
- *Roland L. Nadeau, B.M., M.M.
Music
Chairman—Consultant
Northeastern University
- Robert P. Najjer, B.A., M.B.A.
Accounting
Northeastern University
- Shashi Nath, M.S.C., Ph.D.
Anthropology
- Alvin S. Nathanson, B.A., J.D.
Real Estate
Kobatznick, Stern, & Cooper
- Scott Needhan, B.F.A.
Effective Speaking
Lynn School Dept.
- *Theodore W. Needle, B.B.A., C.P.A.
Accounting
Needle & Needle
- Paul A. Neeson, B.B.A., C.P.C.U.
Insurance
Herbert Fields & Co.
- Mark A. Nelles, B.S.M.E., M.S.E.M.
Marketing
Borg Warner
- David A. Neskey, B.S.A., C.P.A.
Accounting
Price Waterhouse
- John N. Nestor, A.B., J.D.
Law Enforcement
Asst. District Attorney
Eastern District
- Thomas J. Neylon, Jr., A.B., M.A.T.
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Watertown Public Schools
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English
General Electric
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Philosophy
Harvey Industries
- Richard W. Norton, B.B.A.
Electronic Data Processing
Foxboro Company
- *Franklin Norvish, B.S., M.A.
English
Northeastern University
- John A. Novak, B.A., M.Ed.
Earth Science
Northeastern University
- Norbert Nunes, A.B., M.A.
English
- David H. O'Brien, B.S., M.B.A.
Accounting
New England Merchants
National Bank

- Paul D. O'Brien, A.A., B.S., LL.B.
Law Enforcement
General Electric
- William T. O'Brien, A.S., B.S.
Law Enforcement
City of Boston Police Dept.
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Law Enforcement
Suffolk University
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Northeastern University
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U.S. Bureau of Labor
Statistics
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Law
Consultant
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Management
General Electric
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Electronic Data Processing
Home Savings Bank
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Statistics
Dean Junior College
- James W. O'Neil, A.B.
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Security Consultant
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Law Enforcement
Division of Youth Services—
Commonwealth of Mass.
- Richard H. O'Shea, Jr., B.S., M.P.A.
Law Enforcement
Dept. Public Safety, Division
State Police
- Albert J. Ottariano, B.B.A., M.S.B.A.
Statistics
U.S. Dept. of Labor
- J. Rosson Overcash, B.A., A.M.T.
Earth Science
Bunker Hill Community
College
- Richard W. Paine, B.A., M.A., Ph.D.
Psychology
Laboure Junior College
- Howard R. Palmer, LL.B.
Law Enforcement
One Court Street, Boston
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Branch Campus
Representative
Lynn English High School
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Fine Arts
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Northeastern University
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Northeastern University
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Price Waterhouse & Co.
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General Electric
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Northeastern University
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American Mutual Liability
Insurance Co.
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Northeastern University
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Harvard Medical School
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Northeastern University
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Merrimack College
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Phelan & Phelan Co.
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U.S. Administrative
Law Judge
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Massasoit Community College
- Garth I. Pitman, B.A., M.A.
English
Harvard University
- Andrew Plotkin, B.A., M.S.
Law Enforcement
Environmental Research
- Gladys M. Polansky, B.A., B.S., M.A.
English
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Northeastern University
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Education

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Law Enforcement
Dept. of Public Safety,
Commonwealth of Mass.
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Real Estate
Consultant
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Sloane, Puopolo, & Carr
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Natick School Dept.
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Northeastern University
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Northeastern University
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Real Estate
Rappaport & Rakov
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Harvard University
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Boston State College
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State Street Bank
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Northern Essex College
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Dept. of Public Safety
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Beth Israel Hospital
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Polaroid Corp.
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Louis Rudzinsky Associates
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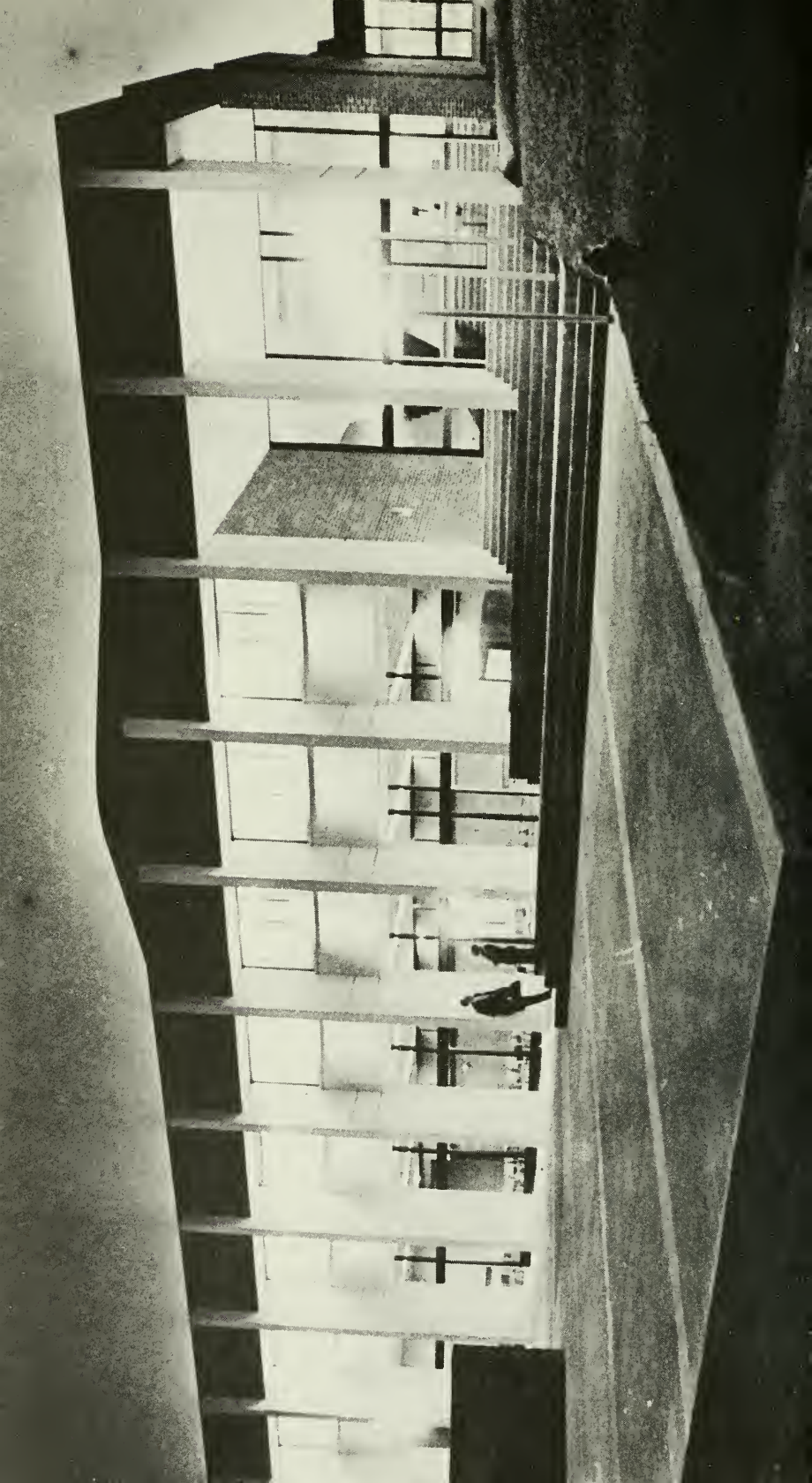
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Suffolk University
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Fisher Junior College
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Eng.
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Business Communication
Services, Inc.
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- Marilyn P. Silvestri, B.A., M.A.
Speech
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Heart
- Eric A. Simonsen, B.S., M.B.A.
Accounting
Price Waterhouse
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English
Northeastern University
- *William I. Sloane, A.B., LL.B.
Law
Sloane, Gay, & Puopolo
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Law Enforcement
Needham Police Dept.
- Robert W. Small, B.A., M.A.
History
Massasoit Community College
- Edwin Smutz, B.A., M.S., Ph.D.
Psychology
U.S. Army Natick Research
Labs
- Paul E. Snoonian, B.S., M.B.A.
Economics
Lowell Technological Institute

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Music
Northeastern University
- Christos Socarides, A.B., M.A.
English
Brockton Public Schools
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Industrial Management
Commonwealth of Mass.
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Literature
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Urban Transportation
Solomon & Schwartz
Associates
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Bryant College
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History
- *Robert M. Spector, LL.B., M.A., M.Ed.,
Ph.D.
History
Worcester State College
- Paul H. Spiers, Jr., B.U.S.
Journalism
- Paul E. Staats, B.S.
Investments
Paine, Webber, Jackson, &
Curtis
- *Francis C. Stacey, A.B., M.B.A.
Industrial Management
American Mutual Liability
Insurance Co.
- George H. Stacey, Jr., A.B., M.B.A.
Electronic Data Processing
Computer Programming
AVCO Everett Research Lab.
- Lee B. Staebler, B.S., M.B.A.
Accounting
Business Consultant
- Charles K. Stefanidakis, B.S.B.A., M.B.A.,
C.P.A.
Cost Accounting
Duddy's, Inc.
- Alan E. Steinberg, B.S., J.D.
Real Estate
Kabatznick, Stern, & Cooper
- Matthew Stevens, B.S.
Radiologic Technology
Consultant
Northeastern University
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Horticulture
- Thomas J. Stockett, B.S.
Human Relations in Personnel
Balco, Maintenance Manager
- Edmund Stoddard, Jr., B.A.
English
Raytheon Service, Inc.
- Joseph F. Stoltz, B.A., M.A., Ph.D.
Economics
Manpower Administration
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Personnel & Industrial
Relations
Raytheon Co.
- John F. Stout, A.B., M.A.
Political Science
Roger Williams College
- James J. Stratford, Jr., LL.B.
Law Enforcement
Consultant
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Sociology
Boston University Medical
School
- Melvin R. Stuart, A.B., A.M.
English
Mansfield High School
- Leslie A. Stulberg, B.A., M.A.
Political Science
- Mark A. Sugarman, B.S., M.B.A.
Marketing
Sugarman Bros.
- Albert M. Sullivan, A.B., J.D.
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Attorney, Army Corps of
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- Cornelius J. Sullivan, LL.B.
Law Enforcement
Attorney
- *Frank E. Sullivan, A.B., Ed.M.
English
Boston Trade School
- *Jeremiah G. Sullivan, B.S.
Computer Programming—
Coordinator
Honeywell Information
Systems, Inc.
- Peter G. Sullivan, A.S., B.S.
Law Enforcement
Town of Sudbury Police Dept.
- Joseph L. Supple, A.B.
Computer Programming
Digital Equipment Corp.
- Gerald Sussman, B.S., A.M.
Marketing
Bryant College
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Finance
N.E. Merchants National Bank
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Marketing
Kenley Realty Co.
- John T. Sweeney, B.S., LL.B.
Law Enforcement
Board of Higher Education
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American Mutual Insurance
Co.
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Raytheon Co.
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Law Enforcement
Consultant, Polygraph
Examiner
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Psychology
U.S. Army Natick Labs

- Priscilla D. Taft, M.D.
Cytopathology
Mass. General Hospital
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Northeastern University
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P. L. Abelson, Co.
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Stoughton High School
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English
Raytheon Co.
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Electronic Data Processing
English High School
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Northeastern University
- Elliot Tenofsky, A.B., M.A.
Political Science
Tufts University
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Law Enforcement
Attorney at Law
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B.S., M.B.A.
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Boston College
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Law Enforcement
Dept. of Public Safety
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Harvard Medical School
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Lexington Public Schools
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Framingham State College
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Charles River Counseling
Center
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Law Enforcement
M.D.C. Police Captain
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High School
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Northeastern University
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Mount Wachusett Community
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Science
Boston Public Schools
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Bentley College
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Data General Corporation
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Boston Police Department
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Health Science
Harvard University
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Consultant
Attleboro Public Library
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Biology
Plant Products Division
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Marketing
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Real Estate
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History
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The Boston Globe
- Robert Ware, A.S., A.B.
Electronic Data Processing
Ware Associates
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History
Northeastern University
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Finance, Insurance
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Psychology
V.A. Out-Patient Clinic
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Suffolk University
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Law Enforcement
Danvers Police Department

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Northeastern Univ.
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Winthrop Public Schools
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Raytheon Service Co.
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Therapeutic Recreation
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University
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Stonehill College
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Wilson Associates
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Government, History
Consolidated Service Corp.
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Management
U.S. Steel Corporation
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Labor Management Relations
National Labor Relations
Board
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Speech
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Law Enforcement
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Chemistry
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- Norman Zankel, A.B., J.D.
Personnel & Industrial
Relations
National Labor Relations
Board
- Philip E. Zawasky, B.S., Ed.M.
Earth Science
Education Liaison—U.S. Navy
- John Zimka, B.S., M.A., Ph.D.
Accounting
Boston College





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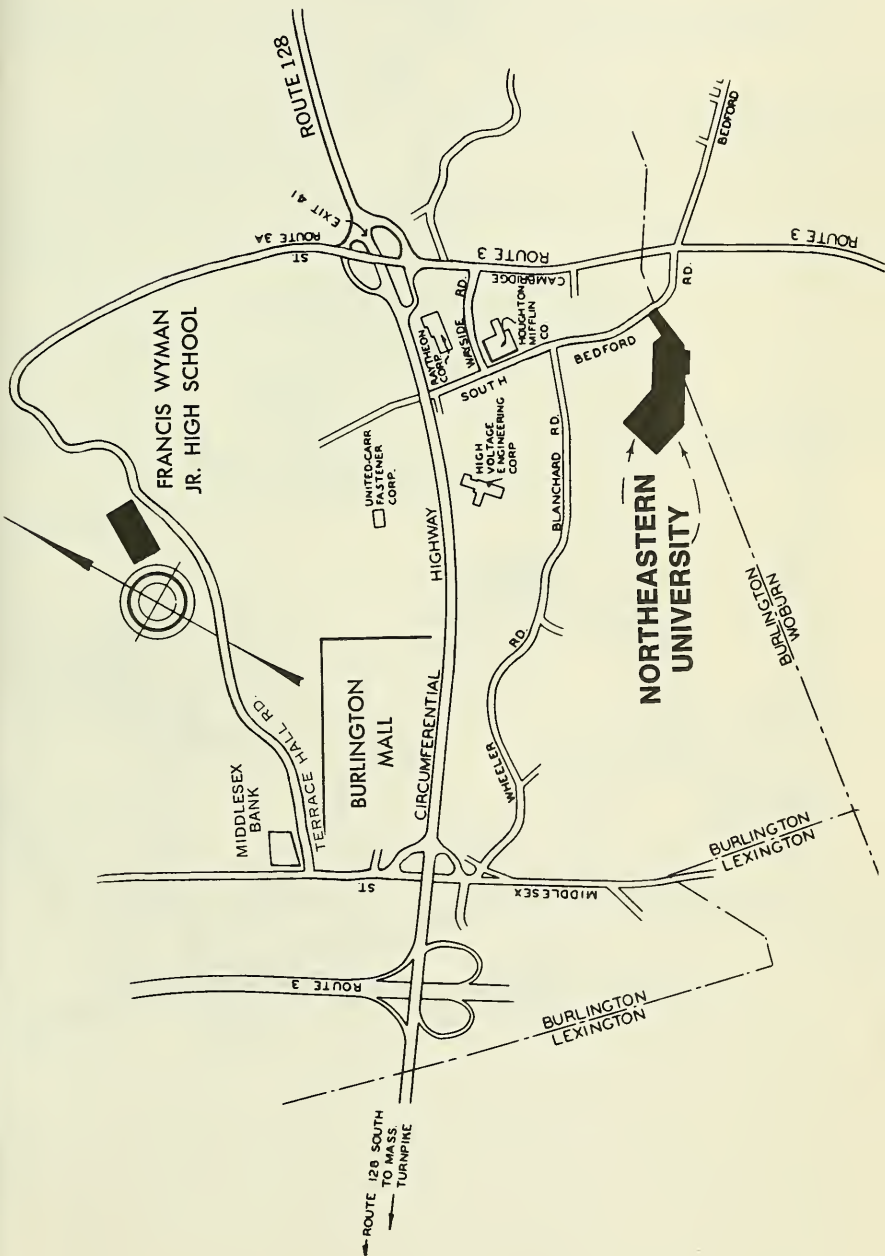
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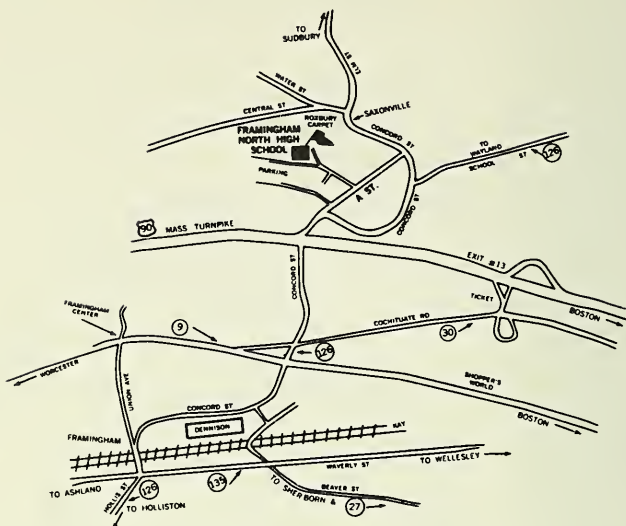


suburban maps

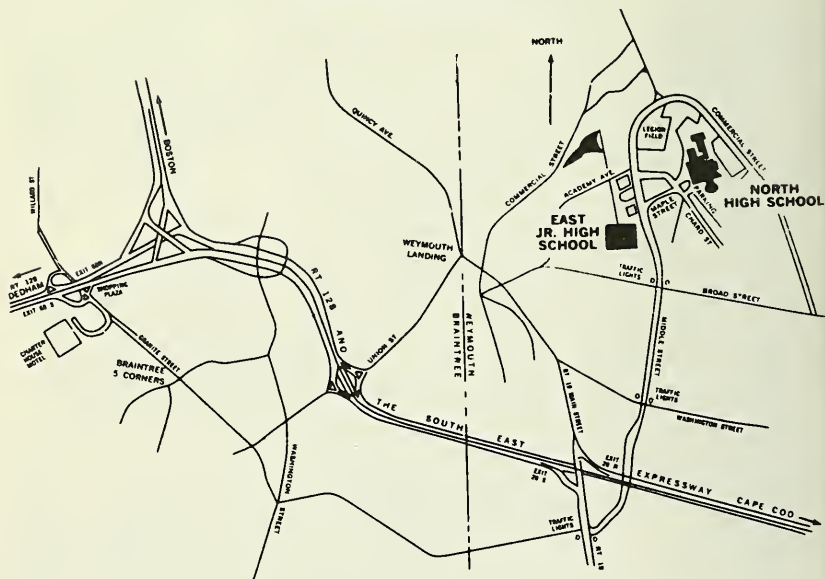
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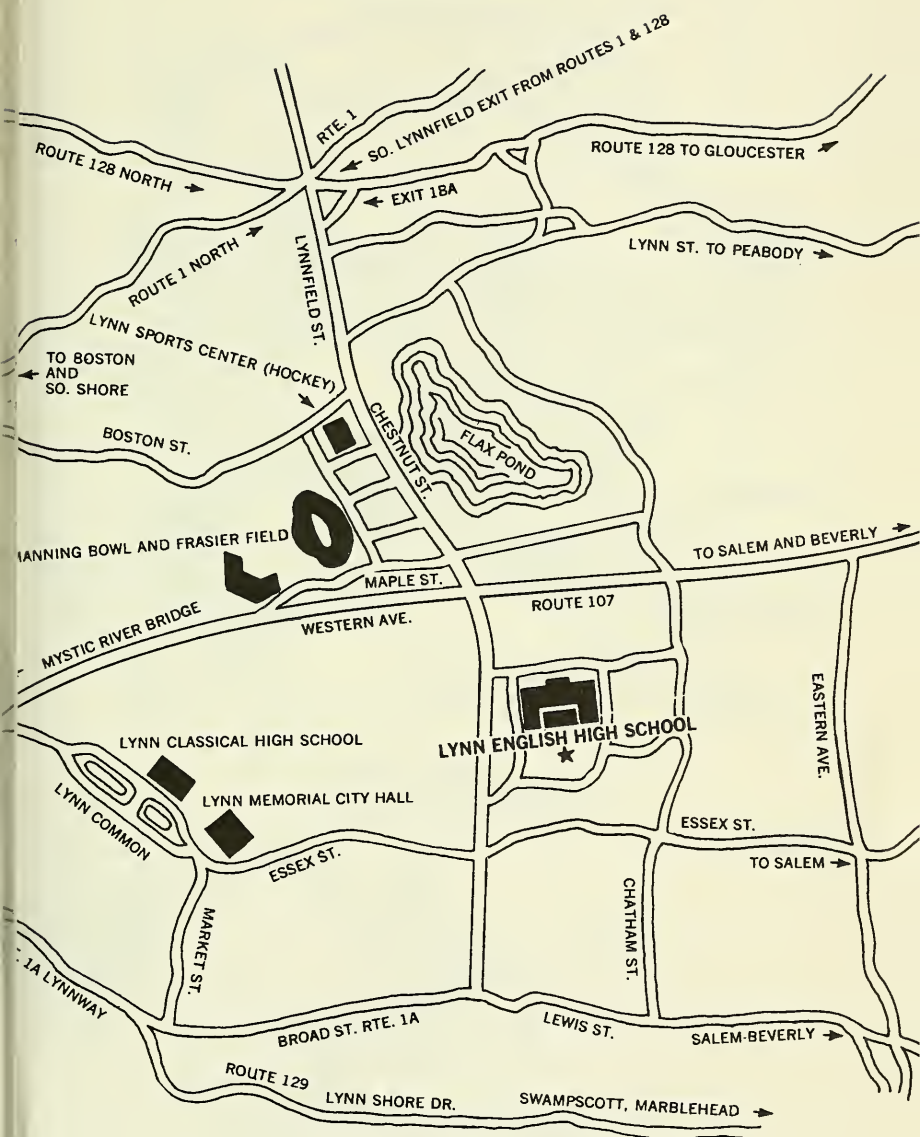
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Weymouth Schools

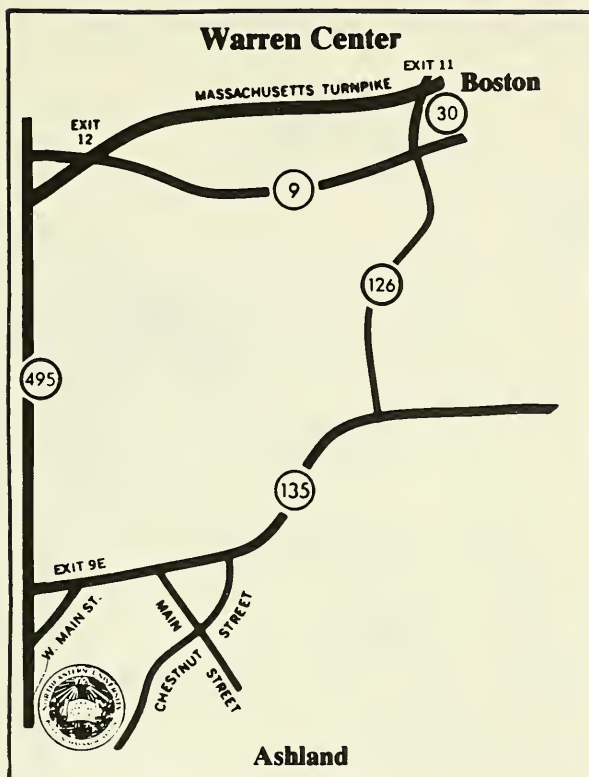


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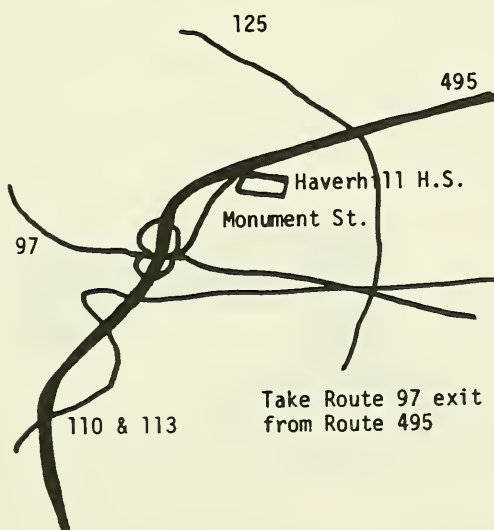


Norwood

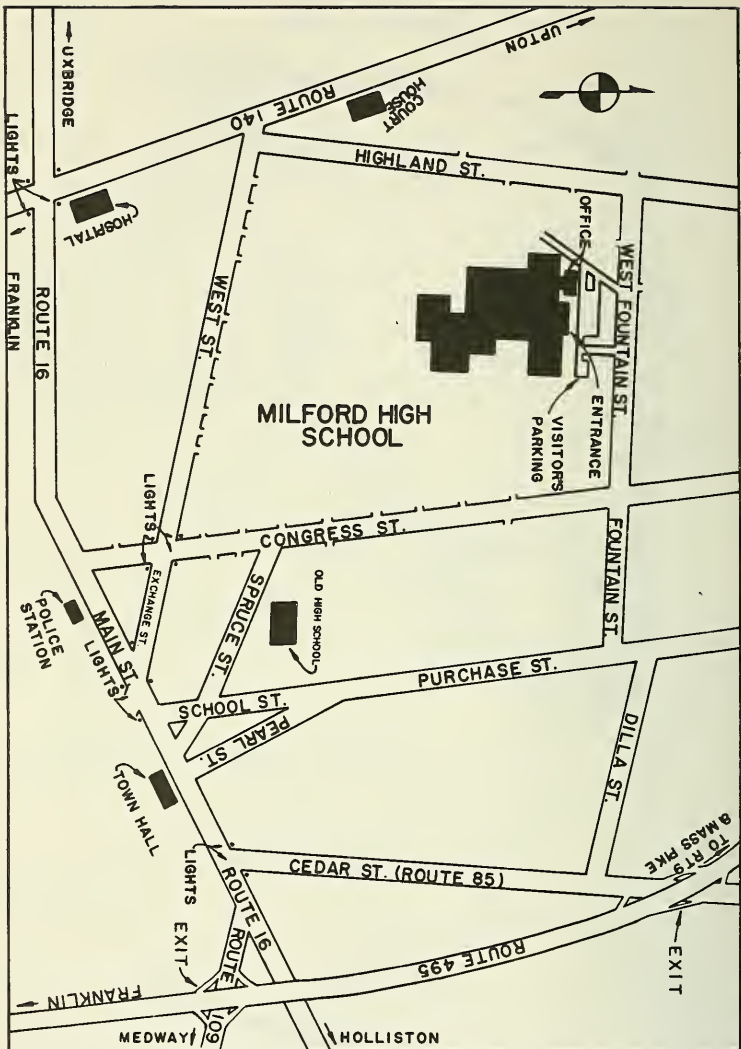




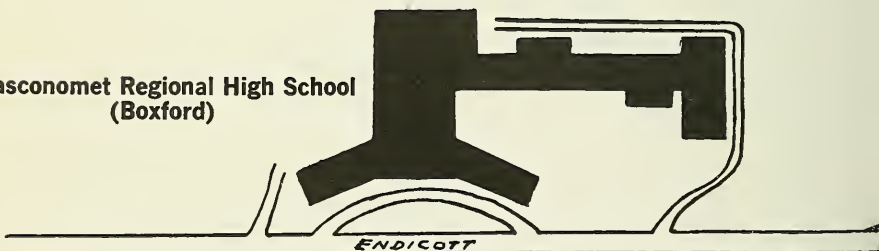
Haverhill High School



Milford High School



Masconomet Regional High School (Boxford)



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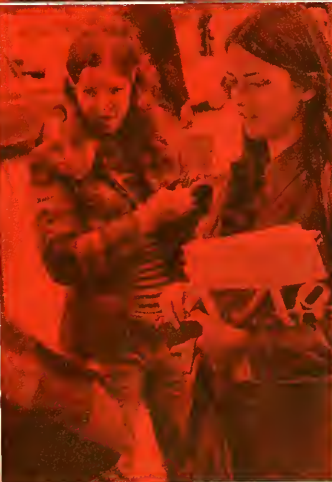
FROM SOUTH- RT. 128 TO RT. 1

RT. 1 TO RT. 95

RT. 95 TO ENDICOTT EXIT

FROM NORTH- RT. 95 TO ENDICOTT EXIT

BASIC DAY COLLEGES COURSE DESCRIPTIONS AND CURRICULUM GUIDE



**1974
1975**



NORTHEASTERN UNIVERSITY BULLETIN

NORTHEASTERN UNIVERSITY BULLETIN

**1974
1975**

COURSE DESCRIPTIONS AND CURRICULUM GUIDE

Boston-Bouvé College
College of Business Administration
College of Criminal Justice
College of Education
College of Engineering
Lincoln College
College of Liberal Arts
College of Nursing
College of Pharmacy and
Allied Health Professions

Northeastern University charges tuition for all courses taken above the normal academic load.

The University reserves the right to make changes in the regulations and courses announced in this bulletin.

Printed at Northeastern University.

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Boston-Bouvé College

PHYSICAL EDUCATION— Men and Women

10.104, Fundamentals of Mathematics; 50.121, Human Development and Learning I; 62.250, Anatomy and Physiology I; Physical Education elective; general studies elective. **Quarter 4**

50.131, Human Development and Learning II; 50.141, Measurement and Evaluation; 62.251, Anatomy and Physiology II; 62.218, Elementary School Activities or general studies elective; Physical Education elective. Before registering for Quarter 6 each student will be asked to designate a level of teaching option: elementary or secondary physical education. **Quarter 5**

62.221, Perceptual-Motor Learning and Development; 62.252, Anatomy and Physiology III; 62.255, Adapted Physical Education; 62.275, Critical Teaching Skills; Physical Education elective. **Quarter 6**

62.210, History and Philosophy of Physical Education; 62.253, Kinesiology; 62.260, Measurement and Evaluation; Physical Education elective; general studies elective. **Quarter 7**

OR

62.277, Outdoor Teaching Lab; 62.218, Elementary School Activities I or 62.256, Athletic Training and Conditioning; two Analysis and Coaching electives; two Boston-Bouvé College electives.

62.254, Exercise Physiology; two Analysis and Coaching electives; two general studies electives. **Quarter 8**

62.277, Outdoor Teaching Lab; 62.218, Elementary School Activities I or 62.256, Athletic Training and Conditioning; two Analysis and Coaching electives; two Boston-Bouvé College electives. **Quarter 9**

OR

62.210, History and Philosophy of Physical Education; 62.253, Kinesiology; 62.260, Measurement and Evaluation; Physical Education elective; general studies elective.

62.282, Supervised Student Teaching. **Quarter 10**

62.270, Administration of Physical Education; 62.280, Curriculum Development; Boston-Bouvé College elective; general studies elective. **Quarter 11**

HEALTH EDUCATION

19.105, Foundations of Psychology I; 50.121, Human Development and Learning I; 62.250, Anatomy and Physiology I; elective. **Quarter 4**

10.104, Fundamentals of Mathematics; 19.106, Foundations of Psychology II; 50.131, Human Development and Learning II; 62.251, Anatomy and Physiology II. **Quarter 5**

HEALTH EDUCATION— Transfer Program

- Quarter 6** 10.104, Fundamentals of Mathematics; 50.114, Education and Social Science; 50.121, Human Development and Learning I; 65.110, Foundations of Health Education; Boston-Bouvé College elective.
- Quarter 6A** 18.142, Basic Animal Biology; 50.131, Human Development and Learning II; 65.207, First Aid and Safety; a Physical Education elective; and one of the following Education Social Science electives: 50.161, Seminar in Group Process, 50.163, Schools as Social Systems, 50.164, Class and Ethnic Relations in Education, 50.165, Organization and Politics of School Systems, 50.166, Teaching and the Human Service Professions, 50.167, Education and Psychosocial Development or 50.168, Education and Social Change.
- Quarter 7** 19.146, Motivation or its equivalent; 50.141, Measurement and Evaluation; 65.222, Drug Use and Abuse; 20.100, Principles of Social Anthropology; Physical Education elective.
- Quarter 8** 55.121, Introduction to Special Education; 65.207, First Aid and Safety; 65.140, Concepts in Health, Aging, and Longevity; 65.223, Human Sexuality and the Family.
- Quarter 9** 65.217, Teaching Procedures/Curriculum in Health Education in School and Community; 65.116, Nutrition; 65.219, Public Health and Community Resources; 65.225, Communicable and Degenerative Diseases; 65.238, Seminar.
- Quarter 10** 65.240, Student Teaching or Field Experience.
- Quarter 11** 50. , Human Foundations elective; 65.233, Organization and Administration of School and Community Health Education; 65.235, Health Counseling; 65.239, Seminar Health Education.

PHYSICAL THERAPY

- Quarter 4** 11.171 Physics for the Life Sciences I; 11.173, Physics Laboratory for the Life Sciences I; 18.125, Human Physiology I; 62.221, Perceptual Motor Learning; elective.
- Quarter 5** 11.172, Physics for the Life Sciences II; 18.126, Human Physiology II; 18.148, Human Anatomy; 64.115, Introduction to Physical Therapy; 19.140, Normal and Abnormal Human Development.
- Quarter 6** 64.123, Gross Anatomy; 64.126, Physiology for Physical Therapists; 64.141, Physical Therapy I; 64.210, Pathology; 64.226, Clinical Medicine I; 64.234, Clinical Psychiatry.
- Quarter 7** 64.130, Applied Anatomy; 64.142, Physical Therapy II; 64.143, Physical Therapy III; 64.227, Clinical Medicine II; 64.228, Clinical Medicine III.
- Quarter 9A** 64.228, Clinical Medicine III; 64.163, Physical Therapy IV; 64.165, Professional Literature and Research; 64.166, Rehabilitation; 64.172, Physical Therapy VI; 64.185, Supervised Clinical Practice.

64.171, Physical Therapy V; 64.174, Physical Therapy VII; 64.175, Ethics and Administration; 64.246, Applied Physiology; 64.187, Supervised Clinical Practice.	Quarter 10A
64.195, Supervised Clinical Practice.	Quarter 11A

RECREATION
EDUCATION

16.180, Physical Geography I; 50.121, Human Development and Learning; 63.150, Anatomy and Physiology I; Recreation Skills; elective.	Quarter 4
16.182, Physical Geography II; 50.131, Human Development and Learning II; 63.151, Anatomy and Physiology II; 63.12Q, Aquatics or 63.12P, Leadership; Recreation Skills; elective.	Quarter 5
29.163, Play Production; 63.126, Outdoor Education I; Recreation Skills; elective.	Quarter 6
63.160, Recreation Resources; 63.128, Survey of Outdoor Education and Park Facilities; 63.267, Youth Groups; 63.129, School Camp (spring); 63.147, Outdoor Education for Handicapped (summer); Recreation Skills.	Quarter 7
63.220, Methods and Materials in Recreation; 63.250, Group Dynamics; 63.262, Recreation and Budgeting and Financing; Recreation Skills; elective.	Quarter 8
63.280, Supervised Field Experience and Teaching.	Quarter 9
63.210, Philosophy of Recreation; 63.285, Introduction to Research; two electives.	Quarter 10
63.290, Research Seminar; electives.	Quarter 11

<i>Department Electives</i>	<i>Quarters Offered</i>
63.153, Psychological Aspects of Disabilities	4 and 6
63.255, Introduction to Therapeutic Recreation	4 and 6
63.152, Analysis of Movement as Applied to Recreation	5
63.260, Administration of Recreation and Parks	8
63.249, Process of Aging	8 and 10
63.127, Outdoor Education II	8
63.256, Recreation Activities for Atypical Individuals and Groups I	8 and 10
63.145, Winter Sports (winter only)	8 and 10
63.146, Camp Administration	10
63.830, Organization and Administration of Recreation Services (fall only)	10
63.812, Seminar in Contemporary Issues (winter only)	10
65.218, Public Health	10
63.257, Workshop in Adaptives	11
63.266, Community Schools	11

College of Business Administration

ACCOUNTING

- Quarter 4** 39.105, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.250, Quantitative Methods I; liberal elective.
- Quarter 5** 39.106, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.251, Quantitative Methods II; liberal elective.
- Quarter 6** 41.251, Intermediate Accounting; 41.253, Cost Accounting I; 45.209, Organization Behavior I; liberal elective.
- Quarter 7** 41.252, Intermediate Accounting; 41.254, Cost Accounting II; 45.210, Organization Behavior II; liberal elective.
- Quarter 8** 41.262, Accounting Theory and Practice; liberal elective; Business elective; open elective.
- Quarter 9** 41.263, Accounting Planning and Control; 45.250, Business and Society; liberal elective; open elective.
- Quarter 10** 45.112, Business Policy; 90.251, Placement Techniques; liberal elective; open elective.
- Quarter 11** All open electives.

ENTREPRENEURSHIP AND NEW VENTURE MANAGEMENT

- Quarter 4** 39.105, Principles of Economics; 43.120, Introduction to Marketing; 49.250, Quantitative Methods I; liberal elective.
- Quarter 5** 39.106, Principles of Economics; 44.120, Introduction to Financial Activity; 49.251, Quantitative Methods II; liberal elective.
- Quarter 6** 45.209, Organization Behavior I; 45.212, New Venture Creation; liberal elective; open elective.
- Quarter 7** 45.210, Organization Behavior II; liberal elective; open electives.
- Quarter 8** 44.159, Small Business Finance; 45.130, Operations Analysis and Venture Capital; liberal elective; open elective.
- Quarter 9** 45.250, Business and Society; liberal elective; Business elective; open elective.
- Quarter 10** 45.112, Business Policy; 49.107, Small Business Management; liberal elective; open elective.
- Quarter 11** 45.131, Control Systems in Smaller Companies; Business elective; open electives.

FINANCE AND INSURANCE

39.105, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.250, Quantitative Methods I; liberal elective.	Quarter 4
39.106, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.251, Quantitative Methods II; liberal elective.	Quarter 5
44.150, Corporate Financial Management; 44.151, Interpreting Financial Data; 45.209, Organization Behavior I; liberal elective.	Quarter 6
44.275, Money and Economic Activity; 44.260, Financial Planning; 45.210, Organization Behavior II; liberal elective.	Quarter 7
Liberal elective; Finance elective; Business elective; open elective.	Quarter 8
45.250, Business and Society; Finance elective; liberal elective; open elective.	Quarter 9
45.112, Business Policy; liberal elective; two open electives.	Quarter 10
All open electives.	Quarter 11

GENERAL BUSINESS ADMINISTRATION

39.105, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.101, Introduction to the Computer; 49.250, Quantitative Methods I; liberal elective.	Quarter 4
39.106, Principles of Economics; 49.251, Quantitative Methods II; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; liberal elective.	Quarter 5
45.209, Organization Behavior I; liberal elective; Business elective; open elective.	Quarter 6
45.210, Organization Behavior II; liberal elective; Business elective; open elective.	Quarter 7
Liberal elective; Business elective; open elective.	Quarter 8
45.250, Business and Society; liberal elective; Business elective; open elective.	Quarter 9
45.112, Business Policy; liberal elective; Business elective; open elective.	Quarter 10
Business elective; open electives.	Quarter 11

INDUSTRIAL RELATIONS

39.105, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.250, Quantitative Methods I; liberal elective.	Quarter 4
39.106, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.251, Quantitative Methods II; liberal elective.	Quarter 5

Quarter 6	45.209, Organization Behavior I; liberal elective; Business elective; open elective.
Quarter 7	39.275, Labor Economics; 45.210, Organization Behavior II; liberal elective; Business elective.
Quarter 8	45.260, Personnel-Industrial Relations; liberal elective; Business elective; open elective.
Quarter 9	45.250, Business and Society; liberal elective; Business elective; open elective.
Quarter 10	45.112, Business Policy; 45.275, Labor Law; liberal elective; open elective.
Quarter 11	45.276, Seminar in Collective Bargaining; open electives.

INTERNATIONAL BUSINESS ADMINISTRATION

Quarter 4	39.105, Principles of Economics; 43.120, Introduction to Marketing; 49.250, Quantitative Methods I; liberal elective.
Quarter 5	39.106, Principles of Economics; 44.120, Introduction to Financial Activity; 49.251, Quantitative Methods II; liberal elective.
Quarter 6	45.209, Organization Behavior I; 46.100, Introduction to International Business; liberal elective; open elective.
Quarter 7	45.210, Organization Behavior II; Business elective; Liberal International elective; open elective.
Quarter 8	Business International elective; Business elective; liberal elective; open elective.
Quarter 9	45.250, Business and Society; Business elective; Liberal International elective; open elective.
Quarter 10	45.112, Business Policy; Business International elective; liberal elective; open elective.
Quarter 11	46.101, Seminar in International Business; open electives.

MANAGEMENT

Quarter 4	39.105, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.250, Quantitative Methods I; liberal elective.
Quarter 5	39.106, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.251, Quantitative Methods II; liberal elective.
Quarter 6	45.209, Organization Behavior I; 49.206, Management Information Systems; liberal elective; open elective.
Quarter 7	45.210, Organization Behavior II; 41.205, Cost Accounting for Management; liberal elective; open elective.
Quarter 8	45.260, Personnel - Industrial Relations; 49.155, Legal Aspects of Business; Business elective; liberal elective.
Quarter 9	45.250, Business and Society; 45.265, Production Management; liberal elective; open elective.

45.112, Business Policy; 90.251, liberal elective; Business elective; open elective.	Quarter 10
All open electives.	Quarter 11

MARKETING

39.105, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.250, Quantitative Methods I; liberal elective.	Quarter 4
39.106, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.251, Quantitative Methods II; liberal elective.	Quarter 5
43.250, Marketing Management I; 45.209, Organization Behavior I; liberal elective; open elective.	Quarter 6
43.251, Marketing Management II; 45.210, Organization Behavior II; liberal elective; open elective.	Quarter 7
43.240, Marketing Research; liberal elective; Business elective; open elective.	Quarter 8
45.250, Business and Society; Marketing elective; liberal elective; open elective.	Quarter 9
43.278, Competitive Strategy; 45.112, Business Policy; liberal elective; open elective.	Quarter 10
Marketing elective; open electives.	Quarter 11

TRANSPORTATION AND
PHYSICAL
DISTRIBUTION
MANAGEMENT

39.105, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.250, Quantitative Methods I; liberal elective.	Quarter 4
39.106, Principles of Economics; 43.120, Introduction to Marketing or 44.120, Introduction to Financial Activity; 49.251, Quantitative Methods II; liberal elective.	Quarter 5
48.101, Principles of Transportation; 45.209, Organization Behavior I; liberal elective; open elective.	Quarter 6
45.210, Organization Behavior II; 48.102, Current Issues in Transportation Policy; liberal elective; open elective.	Quarter 7
Transportation elective; Business elective; liberal elective; open elective.	Quarter 8
45.250, Business and Society; 48.104, Physical Distribution Management; liberal elective; open elective.	Quarter 9
45.112, Business Policy; Transportation elective; liberal elective; open elective.	Quarter 10
Transportation elective; open electives.	Quarter 11

College of Criminal Justice

CRIMINAL JUSTICE

Quarter 4	22.141, State Government and Politics; 11.113, Physics for Criminal Justice Students I or 12.139, General Chemistry or 18.114, Functional Human Anatomy I; Criminal Justice elective; elective.
Quarter 5	11.114, Physics for Criminal Justice Students II or 12.140, General Chemistry or 18.115, Functional Human Anatomy II; Criminal Justice elective; elective.
Quarter 6	92.137, Criminology; 92.141, Criminal Law: Procedural Due Process; two electives.
Quarter 7	92.134, Constitutional Problems I: The Police and The Criminal Suspect; Criminal Justice elective; electives.
Quarter 8	Criminal Justice electives; electives.
Quarter 9	Criminal Justice electives; electives.
Quarter 10	90.255, Professional Development in Criminal Justice; Criminal Justice electives; electives.
Quarter 11	Criminal Justice electives; electives.

College of Education

The College of Education listings include the two terms "area elective" and "specified elective(s)" which are defined as follows:

1. "area elective:" this term refers to an elected course in the Elementary Education major's area concentration in the Humanities, Reading-Language, Science-Mathematics, Social Sciences, or Special Education.
2. "specified elective(s):" this term refers to an elected course in one of the three required Distribution areas. The Distribution requirements are in the Humanities, Social Sciences, and Mathematics-Science areas. Distribution requirements apply to all majors in the College of Education.

If students have any questions regarding curriculum, they should discuss their academic needs with counselors in the College.

ELEMENTARY EDUCATION

56.120, Introduction to Special Education; 50.121, Human Development and Learning I; specified electives.	Quarter 4
Area elective; Education Psychology elective; specified electives.	Quarter 5
51.131, Fundamentals of Arithmetic I; 51.135, Analysis of Teaching and Educational Process; 54.135, Fundamentals of Reading I; area elective.	Quarter 6
51.132, Fundamentals of Arithmetic II; 54.136, Fundamentals of Reading II; area elective; specified elective.	Quarter 7
51.141, Elementary Education; area elective; specified electives.	Quarter 8
50.141, Measurement and Evaluation; 51.142, Elementary Education Compendium II; area elective; elective.	Quarter 9
90.253, Professional Development for Teachers; area elective; Education Humanities elective; elective.	Quarter 10
Area elective; specified elective.	Quarter 11

TEACHING OF BIOLOGY

50.131, Human Development and Learning II; specified electives.	Quarter 4
Education Psychology elective; specified electives.	Quarter 5
51.135 Analysis of Teaching and Educational Process; specified electives.	Quarter 6
Specified electives.	Quarter 7
51.147, Methods and Materials of Teaching the Sciences; 50.141, Measurement and Evaluation; specified electives.	Quarter 8
Specified electives.	Quarter 9

Quarter 10 90.253, Professional Development for Teachers; Education Humanities elective; specified electives.

Quarter 11 Specified electives.

TEACHING OF CHEMISTRY

Quarter 4 50.131, Human Development and Learning II; specified electives.

Quarter 5 Education Psychology elective; specified electives.

Quarter 6 51.135, Analysis of Teaching and Educational Process; specified electives.

Quarter 7 Specified electives.

Quarter 8 50.141, Measurement and Evaluation; 51.147, Methods and Materials of Teaching the Sciences; specified electives.

Quarter 9 Specified electives.

Quarter 10 90.253, Professional Development for Teachers; Education Humanities elective; specified electives.

Quarter 11 Specified electives.

TEACHING OF EARTH SCIENCE

Quarter 4 50.131, Human Development and Learning II; specified electives.

Quarter 5 Education Psychology elective; specified electives.

Quarter 6 51.135, Analysis of Teaching and Educational Process; specified electives.

Quarter 7 Specified electives.

Quarter 8 51.147 Methods and Materials of Teaching the Sciences; 50.141, Measurement and Evaluation; specified electives.

Quarter 9 Specified electives.

Quarter 10 90.253, Professional Development for Teachers; Education Humanities elective; specified electives.

Quarter 11 Specified electives.

TEACHING OF ENGLISH

Quarter 4 50.131, Human Development and Learning II; specified electives.

Quarter 5 Education Psychology elective; specified electives.

Quarter 6 51.135, Analysis of Teaching and Educational Process; specified electives.

Quarter 7 Specified electives.

Quarter 8 50.141, Measurement and Evaluation; 51.143, Methods and Materials of Teaching English; specified electives.

Quarter 9 51.139, Writing and the Teaching of Writing; 54.126, Teaching Reading in Secondary Schools; specified electives.

90.253, Professional Development for Teachers; Education Humanities elective; specified electives.	Quarter 10
Two electives.	Quarter 11

TEACHING OF GENERAL SCIENCE

50.131, Human Development and Learning II; specified electives.	Quarter 4
Education Psychology elective; specified electives.	Quarter 5
51.135, Analysis of Teaching and Educational Process; specified electives.	Quarter 6
Specified electives.	Quarter 7
50.141, Measurement and Evaluation or an elective; 51.147, Methods and Materials of Teaching the Sciences; specified electives.	Quarter 8
Specified electives.	Quarter 9
90.253, Professional Development for Teachers; Education Humanities elective; specified electives.	Quarter 10

TEACHING OF MATHEMATICS

50.131, Human Development and Learning II; specified electives.	Quarter 4
Education Psychology elective; specified electives.	Quarter 5
51.135, Analysis of Teaching and Educational Process; specified electives.	Quarter 6
Specified electives.	Quarter 7
Specified electives.	Quarter 8
50.141, Measurement and Evaluation; 51.124, Modern Mathematics Curricula; 51.145, Methods and Materials of Teaching Mathematics.	Quarter 9
90.253, Professional Development for Teachers; Education Humanities elective; specified electives.	Quarter 10
Specified electives.	Quarter 11

TEACHING OF MODERN LANGUAGES

50.131, Human Development and Learning II; specified electives.	Quarter 4
Education Psychology elective; specified electives.	Quarter 5
51.135, Analysis of Teaching and Educational Process; specified electives.	Quarter 6
Specified electives.	Quarter 7
50.141, Measurement and Evaluation; 51.140, Methods and Materials of Teaching Modern Languages I; specified electives.	Quarter 8

- Quarter 9** 51.144, Methods and Materials of Teaching Modern Languages II; specified electives.
- Quarter 10** 90.253, Professional Development for Teachers; Education Humanities elective; specified electives.
- Quarter 11** Two Advanced Language electives.

TEACHING OF PHYSICS

- Quarter 4** 50.131, Human Development and Learning II; specified electives.
- Quarter 5** Education Psychology elective; specified electives.
- Quarter 6** 51.135, Analysis of Teaching and Educational Process; specified electives.
- Quarter 7** Specified electives.
- Quarter 8** 50.141, Measurement and Evaluation; 51.147, Methods and Materials of Teaching the Sciences; specified electives.
- Quarter 9** Specified electives.
- Quarter 10** 90.253, Professional Development for Teachers; Education Humanities elective; specified electives.
- Quarter 11** Specified electives.

TEACHING OF SOCIAL STUDIES

- Quarter 4** 50.131, Human Development and Learning II; specified electives.
- Quarter 5** Education Psychology elective; specified electives.
- Quarter 6** 51.135, Analysis of Teaching and Educational Process; specified electives.
- Quarter 7** 50.141, Measurement and Evaluation; specified electives.
- Quarter 8** 51.149, Methods and Materials of Teaching Social Studies; 50.154, Current Issues in American Education.
- Quarter 9** 54.126, Teaching Reading in Secondary Schools; specified electives.
- Quarter 10** 90.253, Professional Development for Teachers; specified electives.
- Quarter 11** Specified electives.

SPEECH AND HEARING THERAPY

- Quarter 4** 50.121, Human Development and Learning I; 56.120, Introduction to Special Education; 55.123 Speech Science; 55.124, Anatomy of Auditory Mechanisms.
- Quarter 5** 50.142, Introduction to Educational Statistics; 55.126, Anatomy of Vocal Mechanisms; 55.133, Developmental Phonology; specified elective.

19.135, Personality I; 55.131, Developmental Semantics; 55.142, Introductory Audiology; specified elective.	Quarter 6
19.136, Personality II; 55.141, Phonemic Disorders; Educational Psychology elective; specified elective.	Quarter 7
54.135, Fundamentals of Reading I; 55.154, Fluency Disorders; specified electives.	Quarter 8
55.143, Diagnostic Techniques; 55.141, Orientation to Clinical Practice; specified electives.	Quarter 9
90.253, Professional Development for Teachers; 19.201, Abnormal Behavior; Education Humanities elective; two specified electives.	Quarter 10
Two specified electives.	Quarter 11

College of Engineering

CHEMICAL ENGINEERING

- Quarter 4** 4.101, Chemical Engineering Calculations I; 10.153, Calculus; 11.206, Physics for Engineering Students IV; 11.110, Physics Laboratory for Engineering Students I; 12.147, Organic Chemistry.
- Quarter 5** 2.165, Mechanics I; 4.102, Chemical Engineering Calculations II; 10.154, Calculus; 11.111, Physics Laboratory for Engineering Students II; 12.148, Organic Chemistry.
- Quarter 6** 4.111, Chemical Engineering I; 10.155, Mathematical Analysis; 12.161, Physical Chemistry; 39.125, Economics.
- Quarter 7** 4.112, Chemical Engineering II; 10.156, Mathematical Analysis; 12.162, Physical Chemistry; 39.126, Economics.
- Quarter 8** 4.121, Transport Phenomena I; 4.123, Experimental Methods I; 4.126, Chemical Engineering Thermodynamics; 4.141, Junior Honors Program (elective); liberal elective.
- Quarter 9** 4.122, Transport Phenomena II; 4.124, Experimental Methods II; 4.136, Chemical Engineering Kinetics; 4.141, Junior Honors Program (elective); liberal elective.
- Quarter 10** 4.131, Process Design I or 4.133, Projects I; two of the following three courses: 4.135, Introduction to Nuclear Engineering, 4.138, Process Control Systems, technical elective; 90.257, Professional Development for Engineers; liberal elective.
- Quarter 11** 4.132, Process Design II or 4.134, Projects II; liberal elective; two of the following three courses: 4.137, Applied Mathematics in Chemical Engineering, 4.124, Introduction to Optimization, 4.850, Chemical Process Pollution Control or technical elective.

CIVIL ENGINEERING

- Quarter 4** 1.116, Engineering Measurements and 1.117, Engineering Measurements Laboratory or 1.140, Structural Mechanics I; 10.153, Calculus; 11.110, Physics Laboratory for Engineering Students I; 11.206, Physics for Engineering Students IV; and 39.125, Economics.
- Quarter 5** 1.116, Engineering Measurements and 1.117, Engineering Measurements Laboratory or 1.140, Structural Mechanics I; 2.130, Thermodynamics I; 10.154, Calculus; 11.111, Physics Laboratory for Engineering Students II; 39.126, Economics.
- Quarter 6** 1.141, Structural Mechanics II; 2.116, Dynamics; 10.155, Mathematical Analysis; liberal elective.
- Quarter 7** 1.120, Fluid Mechanics I; 1.142, Structural Mechanics III; 1.180, Materials, 10.156, Mathematical Analysis; and 29.113, Effective Speaking Workshop.

3.183, Electrical Engineering I; 1.150, Concrete Design I or 1.178, Soil Mechanics and 1.179, Soil Mechanics Laboratory; liberal elective; one of the following four courses: 1.106, Applied Probability Theory for Civil Engineers, 1.143, Structural Analysis I, 1.175, Engineering Geology, 5.245, Basic Engineering Statistics.

Quarter 8

1.193, Environmental Engineering I; 1.178, Soil Mechanics and 1.179, Soil Mechanics Laboratory or 1.150, Concrete Design I; liberal elective; one of the following four courses: 1.105, Civil Engineering Systems, 1.143, Structural Analysis I, 1.144, Structural Analysis II, 5.260, Engineering Economy.

Quarter 9

1.160 Structural Design I; 90.257, Professional Development for Engineers; liberal elective; two of the following courses: 1.101, Special Topics, 1.106, Applied Probability Theory for Civil Engineers, 1.122, Hydraulic Engineering, 1.143, Structural Analysis I, 1.144, Structural Analysis II, 1.152, Concrete Design II, 1.175, Engineering Geology, 1.224, Environmental Chemistry, 5.245, Basic Engineering Statistics.

Quarter 10

Liberal elective; three of the following courses: 1.101, Special Topics, 1.105, Civil Engineering Systems, 1.134, Transportation Engineering, 1.135, Construction Engineering, 1.144, Structural Analysis II, 1.145, Structural Analysis III, 1.152, Concrete Design II, 1.161, Structural Design II, 1.174, Foundation Engineering, 1.194, Environmental Engineering II, 1.196, Environmental Laboratory, 1.259, Air Pollution, 5.260, Engineering Economy.

Quarter 11

ELECTRICAL ENGINEERING

3.111, Circuits and Systems I; 10.153, Calculus; 11.206, Physics for Engineering Students IV; 11.110, Physics Laboratory for Engineering Students I; liberal elective.

Quarter 4

3.112, Circuits and Systems II; 10.154, Calculus; 11.207, Elementary Modern Physics; 11.111, Physics Laboratory for Engineering Students II; liberal elective.

Quarter 5

2.130, Thermodynamics I; 3.113, Circuits and Systems III; 3.131, E.E. Laboratory I-Measurements; 10.155, Mathematical Analysis; liberal elective.

Quarter 6

2.163, Mechanics for Electrical Engineers; 3.122, Circuits and Systems IV; 3.132, E.E. Laboratory II-Circuits and Systems; 10.156, Mathematical Analysis; liberal elective.

Quarter 7

2.130, Thermodynamics I; 2.199, Materials Science; 3.141, Electronics I; 3.161, Electromagnetic Field Theory I.

Quarter 8

3.133, E.E. Laboratory III-Devices; 3.142, Electronics II; 3.162, Electromagnetic Field Theory II; liberal elective; and one of the following four courses: 3.191, Design and Organization of Digital Computers, 3.261, Wave Transmission and Reception, 3.285, Introduction to Theory of Digital Computation, 3.292, Mathematical Techniques in Electrical Engineering I.

Quarter 9

- Quarter 10** 3.134, E.E. Laboratory IV; 3.175, Electromechanical Dynamics; 90.257, Professional Development for Engineers; liberal elective; two of the following courses: 3.191, Design and Organization of Digital Computers, 3.218, Control System Theory, 3.221, Electric Power Systems I, 3.233, E.E. Power Laboratory I, 3.237, Senior Project Laboratory I, 3.238, Senior Project Laboratory II, 3.242, Theory and Technology of Semiconductor Devices I, 3.251, Communication Theory, 3.281, Fundamentals of Computation Structures, 3.292, Mathematical Techniques in Electrical Engineering II, 3.295, Numerical Methods, 3.296, Digital Techniques.
- Quarter 11** Liberal elective; two or three of the following courses: 3.144, Electronics III, 3.191, Design and Organization of Digital Computers, 3.222, Electric Power Systems II, 3.234, E.E. Power Laboratory II, 3.327, Senior Project Laboratory I, 3.238, Senior Project Laboratory II, 3.241, Selected Topics in Electronics, 3.243, Theory and Technology of Semiconductor Devices II, 3.251, Communication Theory, 3.261, Wave Transmission and Reception, 3.262, Advanced Topics in Electromagnetic Field Theory, 3.285, Introduction to Theory of Digital Computation, 3.292, Mathematical Techniques in Electrical Engineering I, 3.293, Mathematical Techniques in Electrical Engineering II, 3.296, Digital Techniques.

ELECTRICAL ENGINEERING Power Systems

- Quarter 4** 3.111, Circuits and Systems I; 10.153, Calculus; 11.206, Physics for Engineering Students IV; 11.110, Physics Laboratory for Engineering Students I; liberal elective.
- Quarter 5** 3.112, Circuits and Systems II; 10.154, Calculus; 11.207, Elementary Modern Physics; 11.111, Physics Laboratory for Engineering Students II; liberal elective.
- Quarter 6** 2.130, Thermodynamics I; 3.113, Circuits and Systems III; 3.131, E.E. Laboratory I-Measurements; 10.155, Mathematical Analysis; liberal elective.
- Quarter 7** 2.131, Thermodynamics II; 3.122, Circuits and Systems IV; 3.132, E.E. Laboratory II-Circuits and Systems; 10.156, Mathematical Analysis; liberal elective.
- Quarter 8** 3.141, Electronics I; 3.161, Electromagnetic Field Theory I; 3.174, Basic Power Circuits; liberal elective; added elective, 10.8G1, Probability.
- Quarter 9** 2.163, Mechanics for Electrical Engineers; 3.142, Electronics II; 3.162, Electromagnetic Field Theory II; 3.175, Electromechanical Dynamics; liberal elective.
- Quarter 10** 3.176, Machines and Systems; 3.233, E.E. Power Laboratory I; 3.221, Electric Power Systems I; 3.823, Mathematical Methods in Electrical Engineering; 90.257, Professional Development for Engineers; liberal elective.

3.222, Electric Power Systems II; 3.234, E.E. Power Laboratory II; 4.146, Introduction to Nuclear Engineering (E.E.); liberal elective; one of the following courses: 1.193, Environmental Engineering I, 2.196, Materials Science, 3.191, Design and Organization of Digital Computers, 5.260, Engineering Economy.

Quarter 11

GENERAL ENGINEERING PROGRAM

10.153, Calculus; 11.206, Physics for Engineering Students IV; 11.110, Physics Laboratory for Engineering Students I; liberal elective; Engineering Science elective.

Quarter 4

10.154, Calculus; 11.111, Physics Laboratory for Engineering Students II; liberal elective; Engineering Science elective; Coordinated Study.

Quarter 5

Liberal elective; Engineering Science elective; Coordinated Studies.

Quarter 6

Liberal elective; Engineering Science electives; Coordinated Study.

Quarter 7

Engineering Science electives; Coordinated Studies.

Quarter 8

Engineering Science electives; Coordinated Studies.

Quarter 9

Engineering Science electives; Coordinated Studies.

Quarter 10

Engineering Science elective; Coordinated Studies.

Quarter 11

INDUSTRIAL ENGINEERING

5.128, Work Design; 10.153, Calculus; 11.206, Physics for Engineering Students IV; 11.110, Physics Laboratory for Engineering Students I; 39.115, Principles and Problems of Economics.

Quarter 4

5.145, Probablistic Analysis for Engineers; 10.154, Calculus; 11.111, Physics Laboratory for Engineering Students II; 39.116, Principles and Problems of Economics; one of the following three courses: 2.130, Thermodynamics I, 2.196, Materials Science, 5.201, Principles of Computation and Programming I.

Quarter 5

5.147, Statistics I; 29.102, Effective Speaking; Mathematics elective; two of the following five courses: 1.124, Flow of Fluids, 2.130, Thermodynamics I, 2.165, Mechanics I, 3.183, Electrical Engineering I, 5.202, Principles of Computation and Programming II.

Quarter 6

5.161, Operations Research I; liberal elective; technical elective; one of the following courses: 2.130, Thermodynamics I, 2.166, Mechanics II, 2.196, Materials Science, 3.184, Electrical Engineering II, 5.201, Principles of Computation and Programming I.

Quarter 7

5.161, Operations Research I; liberal elective; technical elective; one of the following courses: 1.124, Flow of Fluids, 2.130, Thermodynamics I, 2.165, Mechanics I, 3.183, Electrical Engineering I, 5.202, Principles of Computation and Programming II.

Quarter 8

- Quarter 9** 5.163, Operations Research II; 5.130, Systems I; liberal elective; one of the following courses: 2.130, Thermodynamics I, 2.166, Mechanics II, 2.196, Materials Science, 3.184, Electrical Engineering.
- Quarter 10** 5.130, Systems I; 5.186, People in Organizations; 5.190, Senior Project; 90.257, Professional Development for Engineers; Industrial Engineering elective; non-Engineering elective.
- Quarter 11** 5.131, Systems II; non-Engineering elective; Engineering electives.

MECHANICAL ENGINEERING

- Quarter 4** 2.165, Mechanics I; 10.153, Calculus; 11.206, Physics for Engineering Students IV; 11.110, Physics Laboratory for Engineering Students I; 39.115, Principles and Problems of Economics.
- Quarter 5** 2.166, Mechanics II; 10.154, Calculus; 2.130, Thermodynamics I; 11.111, Physics Laboratory for Engineering Students II; liberal elective.
- Quarter 6** 2.167, Mechanics III; 2.131, Thermodynamics II; 2.192, Measurement and Analysis; 10.155, Mathematical Analysis.
- Quarter 7** 2.155, Fluid Mechanics I; 2.196, Materials Science; 10.156, Mathematical Analysis; Mechanics IV.
- Quarter 8** Three electives; liberal elective.
- Quarter 9** 2.150, Heat Transfer; 2.176, Dynamics; elective; liberal elective.
- Quarter 10** 90.257, Professional Development for Engineers; three electives; liberal elective.
- Quarter 11** Three electives; liberal elective.

MECHANICAL ENGINEERING— Five-Year B.S.-M.S.

- Quarter 6** 2.131, Thermodynamics II; 2.167, Mechanics III; 2.192, Measurement and Analysis; 10.155, Mathematical Analysis; liberal elective.
- Quarter 7** 2.155, Fluid Mechanics I; 2.196, Materials Science; 10.156, Mathematical Analysis; two liberal electives.
- Quarter 8** 2.826, Mathematical Methods for Mechanical Engineers I; three electives; liberal elective; graduate elective.
- Quarter 9** 2.827, Mathematical Methods for Mechanical Engineers II; three electives; liberal elective; graduate elective.
- Quarter 10A** Graduate electives (8 Q.H.); electives (8 Q.H.); seminar.
- Quarter 11S** Graduate electives (8 Q.H.); electives (8 Q.H.); seminar.
- Quarter 12** Graduate electives (4 Q.H.); electives (8 Q.H.); thesis.

**ENGINEERING
TRANSFER PROGRAM**

TRANSFER STUDENTS

All engineering transfer students take: 9.104, Computer Program-
ming; 10.140, Mathematical Analysis IV-V; 11.126, Physics Review;
Civils add: 1.140, Structural Mechanics I; Mechanicals add: 2.164,
Mechanics; Electricals add: 3.119, Circuits and Systems A;
Chemicals add: 4.103, Chemical Engineering Calculations;
Transfers and Industrials add: 10.208, Probability.

**Special Term
Quarter 5T**

Civils take: 1.141, Structural Mechanics II; 2.116, Dynamics; 2.130,
Thermodynamics I; and 10.155, Mathematical Analysis. Electricals
take: 2.130, Thermodynamics I; 3.120, Circuits and Systems B;
10.155, Mathematical Analysis; liberal elective.

**Special Term
Quarter 6T**

Lincoln College

B.E.T. ELECTRICAL

Quarter 4	10.421, Calculus A; 3.451, Circuit Analysis I; 11.420, Physics IV (Electromagnetic Field); liberal elective.
Quarter 5	3.324, Circuits Laboratory I; 3.440, Physical Electronics; 3.452, Circuit Analysis II; 10.422, Calculus B; liberal elective.
Quarter 6	3.311, Electronics I; 3.325, Circuits Laboratory II; 3.453, Circuits Analysis III; 3.460, Engineering Analysis; and 39.115, Principles of Economics.
Quarter 7	3.312, Electronics II; 3.323, Electronic Laboratory; 3.410, Electrical Measurements; 3.430, Energy Conversion; and 3.454, Circuits Analysis IV.
Quarter 8	3.470, Digital Computers; 3.313, Electronics III; 3.327, Advanced Electronic Laboratory I.
Quarter 9	3.477, Control Engineering; 3.328, Advanced Electronic Laboratory II; liberal arts elective.
Quarter 10	3.478, Control Engineering II; 3.329, Advanced Electronic Laboratory III; technical elective.
Quarter 11	3.437, Distributed Systems; 3.461, Engineering Analysis II; or 2.411, Mechanics A; technical elective.

B.E.T. MECHANICAL

Quarter 4	10.421, Calculus A; 2.411, Mechanics A; 9.464, Engineering Design Graphics IV; 2.431, Materials A.
Quarter 5	2.414, Stress Analysis A; 2.412, Mechanics B; 10.422, Calculus B; 2.461, Machine Shop or a liberal arts elective.
Quarter 6	2.415, Stress Analysis B; 2.421, Thermodynamics A; 2.462, Mechanical Technology Laboratory I; 2.413, Mechanics C; and 39.115, Principles and Problems of Economics.
Quarter 7	2.422, Thermodynamics B; 2.465, Heat Technology Laboratory I; 2.441, Fluid Mechanics A; and 3.420, Electricity and Electronics I.
Quarter 8	2.417, Mechanical Design A; 2.463, Mechanical Laboratory II; 2.442, Fluid Mechanics B; technical elective.
Quarter 9	2.418, Mechanical Design B; 2.464, Mechanical Laboratory III; 2.423, Thermodynamics; technical elective; liberal arts elective or Industrial Engineering elective.
Quarter 10	4.481, Nuclear Technology; 2.466, Heat Laboratory; 2.424, Thermodynamics D; technical elective; liberal arts elective.
Quarter 11	2.467, Project Laboratory; two technical electives; liberal arts elective.

College of Liberal Arts

The following models illustrate the kinds of curricula from which an upper-class student in the College of Liberal Arts may select his/her program. Since the College offers programs leading to two degrees in most majors—the Bachelor of Arts and the Bachelor of Science—a student should discuss his academic needs and goals with counselors in the College to determine the program most appropriate for him.

Generally, the Bachelor of Science requires greater concentration in the major field of study. Requirements for the Bachelor of Arts degree include minimum “distribution requirements” (courses in the Humanities, Social Sciences, Science/Mathematics) and completion of a modern foreign language through the intermediate level.

Other programs available include an interdisciplinary major in Human Services which is described in the University *Bulletin* and an Independent Major, whereby a student may, with guidance, design his own major. Information about these and all other programs is available in the Dean's Office.

AFRO-AMERICAN STUDIES

25.250, 251, Foundations of Black Culture I and II; 25.100, 101, Science and Black Society I and II; 23.241, Afro-American History; 30.267, 268, Afro-American Literature I and II; 25.050, Educational Issues for Black Americans; 25.254, Black Community and Social Change; 25.210, Contemporary Problems in Black Society; 25.170, Economic Problems of Black Americans; 25.257, Field Seminar; 25.259, Directed Study toward Senior Thesis.

Foreign language and distribution requirements.

In addition, students must consult the department for recommended electives.

Bachelor of Arts

ART HISTORY

27.118, 119, History of Art I and II; Studio Course; 12 Art History electives; two History electives; one Music elective; one Philosophy elective.

Foreign language and distribution requirements.

27.118, 119, History of Art I and II; Studio course; 12 Art History electives; two History electives; one Music elective; one Philosophy elective.

Bachelor of Arts

Bachelor of Science

BIOLOGY

18.124, Introductory Seminar in Biology (concomitant with 18.131); 18.131, General Biology; 18.132, Animal Biology; 18.133, Plant Biology; 18.134, Environmental and Population Biology; 18.135, Genetics and Developmental Biology; 18.136, Cell Biology; four Biology electives.

Bachelor of Arts

Fundamentals of Mathematics or Calculus (one year); 11.171, 172, Physics for the Life Sciences I and II; 11.173, 174, Physics Laboratory for the Life Sciences I and II; or 11.117, Physics for Science Majors I; 11.119, Physics for Science Majors III; 11.124, 125, Physics Laboratory for Science Majors I and II; 12.106, 107, General Chemistry I and II; 12.161, Physical Chemistry; or 12.171, Analytical Chemistry; 12.144, 145, Organic Chemistry I and II.

Foreign language and distribution requirements.

Bachelor of Science

18.124, Introductory Seminar in Biology (concomitant with 18.131); 18.131, General Biology; 18.132, Animal Biology; 18.133, Plant Biology; 18.134, Environmental and Population Biology; 18.135, Genetics and Developmental Biology; 18.136, Cell Biology; 18.280, Senior Seminar; four Biology electives.

Calculus (one year); 11.117, 118, 119, Physics for Science Majors I, II, and III; 11.124, 125, Physics Laboratory for Science Majors I and II; 12.106, 107, General Chemistry I and II; 12.161, Physical Chemistry; or 12.171, Analytical Chemistry; 12.144, 145, Organic Chemistry I and II; two approved additional Science electives.

Foreign language requirement.

CHEMISTRY

Bachelor of Arts

12.103, 104, General Chemistry I and II; 12.105, Analytical Chemistry; 12.153, 154, 155, Organic Chemistry I, II and III; 12.166, 169, 170, Physical Chemistry I, II and III; 12.185, Inorganic Chemistry; 12.200, Principles of Experimental Chemistry; 12.201, 202, Integrated Chemistry Laboratory I and II; 12.181, Instrumental Analysis.

10.181, 182, 183, Calculus I, II, and III; 11.117, 118, 119, Physics for Science Majors, I, II, and III; 11.124, 125, Physics Laboratory for Science Majors I and II.

Foreign language and distribution requirements.

Bachelor of Science

12.103, 104, General Chemistry I and II; 12.105, Analytical Chemistry; 12.153, 154, 155, Organic Chemistry I, II, and III; 12.166, 169, 170, Physical Chemistry I, II, and III; 12.185, Inorganic Chemistry; 12.200, Principles of Experimental Chemistry; 12.201, 202, Integrated Chemistry Laboratory I and II; 12.181, Instrumental Analysis; 12.213, Advanced Inorganic Chemistry; 12.253, Identification of Organic Compounds; two advanced Science or Mathematics electives; one advanced Laboratory or Research course.

10.181, 182, 183, Calculus I, II and III; 10.207, Differential Equations; 11.117, 118, 119, Physics for Science Majors I and II; 33.203, 204, Intermediate German I and II or 34.203, 204, Intermediate Russian I and II.

DRAMA

29.109, Speech for the Theatre; 29.110, Voice and Articulation; 29.150, Elementary Acting I; 29.160, Concepts of Direction; 29.170, Scenic Production; 29.200, 201, History of the Theatre I and II; Theatre Practicum; eight Drama electives.

Eight quarter hours Psychology *or* four quarter hours each Anthropology and Sociology.

Foreign language and distribution requirements.

In addition, the department recommends that a Physical Education skills course be elected each quarter.

29.109, Speech for the Theatre; 29.110, Voice and Articulation; 29.150, Elementary Acting I; 29.160, Concepts of Direction; 29.170, Scenic Production; 29.200, 201, History of the Theatre I and II; Theatre Practicum; eight Drama electives.

In addition, the department recommends that a Physical Education skills course be elected each quarter.

Bachelor of Arts

Bachelor of Science

ECONOMICS

39.115, 116, Principles and Problems of Economics I and II; 39.250, 251, Statistics I and II; 39.255, Microeconomic Theory; 39.256, Macroeconomic Theory; six Economics electives.

10.104, 105, Fundamentals of Mathematics I and II; four Social Science electives other than Economics.

Foreign language and distribution requirements.

39.115, 116, Principles and Problems of Economics I and II; 39.250, 251, Statistics I and II; 39.255, Microeconomic Theory; 39.256, Macroeconomic Theory; 39.293, Introduction to Econometrics *or* 39.294, Problems in Economic Research; ten Economics electives.

10.104, 105, Fundamentals of Mathematics I and II; four Social Science electives other than Economics.

Bachelor of Arts

Bachelor of Science

ENGLISH

30.110, Literary Analysis of Poetry; 30.120, Introduction to Linguistics *or* 30.121, Foundations of the English Language; 30.170, 171, Survey of English Literature I and II; two American Literature Courses*; 30.222, *or* 223, Chaucer I *or* II *or* 30.218, Medieval Literature*; 30.250, *or* 251, Shakespeare*; 18th-Century English Literature *or* Period Figure Course*; 19th-Century English Literature *or* Period Figure Course*; one Seminar*; two English electives; 23.130, 131, England to 1688 and England since 1688.

Foreign language and distribution requirements.

Bachelor of Arts

Bachelor of Science

30.110, Literary Analysis of Poetry; 30.120, Introduction to Linguistics or 30.121, Foundations of the English Language; 30.170, 171, Survey of English Literature I and II; two American Literature Courses*; 30.222, or 223, Chaucer I or II or 30.218, Medieval Literature*; 30.250, or 251, Shakespeare*; 18th-Century English Literature or Period Figure Course*; 19th-Century English Literature or Period Figure Course*; one Seminar*; four English electives; 23.130, 131, England to 1688 and England since 1688.

Distribution requirements as required for the Bachelor of Arts program.

*The Seminar may be substituted for a period or figure course thus adding one English elective.

GEOLOGY

Bachelor of Arts

16.201, Physical Geology; 16.203, Physical Geology Laboratory; 16.202, Historical Geology; 16.204, Historical Geology Laboratory; 16.211, Descriptive Mineralogy; 16.212, Optical Crystallography; 16.213, Optical Mineralogy; 16.271, Geology Seminar; six Geology electives.

10.104, 105, Fundamentals of Mathematics I and II or 10.106, 107, Calculus I and II; 11.117, Physics for Science Majors I or 11.171, Physics for the Life Sciences I; 12.106, 107, General Chemistry I and II.

Foreign language and distribution requirements.

Bachelor of Science

16.201, Physical Geology; 16.203, Physical Geology Laboratory; 16.202, Historical Geology; 16.204, Historical Geology Laboratory; 16.211, Descriptive Mineralogy; 16.212, Optical Crystallography; 16.213, Optical Mineralogy; 16.271, Geology Seminar; eight Geology electives.

10.106, 107, Calculus I and II or 10.150, 151, 152, Calculus I, II and III; 11.117, 118, 119, Physics for Science Majors, I, II, and III; 12.106, 107 or 12.103, 104, General Chemistry I and II; 12.105 or 12.171, Analytical Chemistry, or 12.161, Physical Chemistry; two approved additional Science electives; six courses in the Humanities and/or Social Sciences.

HISTORY

Bachelor of Arts

23.101, 102, Western Civilization I and II; 23.210, 211, United States to 1877, United States since 1877; 23.199, The Historian's Craft; ten History electives distributed according to departmental requirements.

Foreign language and distribution requirements.

Recommended: Courses in the related Social Sciences.

Bachelor of Science

23.101, 102, Western Civilization I and II; 23.210, 211, United States to 1877, United States since 1877; 23.199, The Historian's Craft; twelve History electives distributed according to departmental requirements.

One course in Mathematics or Statistics (e.g., 10.104, 10.105, 19.120, 21.239, 39.250); three of the following: 39.115, Principles and Problems of Economics, 21.100, Principles of Sociology, 20.100, Principles of Social Anthropology, 22.110, Introduction to Politics, 19.105, Foundations of Psychology, 18.119, Environment and Man; two approved courses in Computer Programming, Data Processing, or Social Science Methodology.

HUMAN SERVICES

Prerequisite courses: 19.105, 106, Foundations of Psychology I and II; 19.120, Statistics in Psychology or 21.239, Introduction to Sociological Statistical Analysis; 21.100, Introduction to Sociology; 22.102, Introduction to Political Science II; 50.166, Human Service Professions; 50.167, Psychosocial Development.

Core Courses: 19.135, 136, Personality I and II; 19.201, Psychology of Abnormal Behavior; 21.200, 201, Group Behavior—The Sociological Imagination I and II, or 29.107, Interpersonal Communications and 29.117, Group Discussion; 21.245, Community Analysis; 21.255, Sociology of Formal Organizations; 50.590, Introduction to Rehabilitation; 53.804, Counseling Theory and Process, or 92.161, Delinquency and Adolescent Behavior; 92.160, Social Welfare Problems; 50.951, Medical Problems.

Approved four-course specialization; two supervised field courses.

Foreign language and distribution requirements.

Bachelor of Arts

INDEPENDENT MAJOR

A student who is able to demonstrate that none of the established majors listed provides preparation for the student's professional goal may petition for an Independent Major. Before filing a petition, it is necessary for the student to discuss the aims and ideas for the proposed major with a counselor in the Dean's Office who will help make course selections and help assign a faculty adviser to the student. Each proposal is considered on its individual merits by a special committee. No student may be considered an Independent Major until the proposal submitted has been approved by the committee.

Bachelor of Arts

JOURNALISM

38.101, 102, History and Principles of Journalism I and II; 38.103, 104, Fundamentals of Newswriting I and II; 38.105, 106, Techniques of Journalism I and II; 38.107, 108, Press and Society I and II.

23.210, 211, United States to 1877, United States since 1877; two History electives; 30.170, 171, Survey of English Literature I and II; two English electives; two Political Science electives; two of the following: 26.101, 102, Introduction to Philosophy I and II, 21.100, Introduction to Sociology, 20.100, Principles of Social Anthropology, 39.115, 116, Principles and Problems of Economics I and II.

Bachelor of Arts

Bachelor of Science

38.101, 102, History and Principles of Journalism I and II; 38.103, 104, Fundamentals of Newswriting I and II; 38.105, 106, Techniques of Journalism I and II; 38.107, 108, Press and Society I and II.

23.210, 211, United States to 1877, United States since 1877; four English electives; six Mathematics and/or Science electives.

MATHEMATICS**Bachelor of Arts**

10.181, 182, 183, Calculus I, II, and III; 10.184, 185, Calculus and Linear Methods I and II; 10.186, 187, Differential Equations and Linear Methods I and II; four approved Mathematics electives selected in consultation with an advisor.

11.117, 118, 119, Physics for Science Majors I, II and III.

Foreign language and distribution requirements.

Bachelor of Science

10.181, 182, 183, Calculus I, II and III; 10.184, 185, Calculus and Linear Methods I and II; 10.186, 187, Differential Equations and Linear Methods I and II; seven approved Mathematics electives selected in consultation with an advisor.

11.117, 118, 119, Physics for Science Majors I, II, and III; two non-science courses.

MODERN LANGUAGES**Bachelor of Arts**

Eight advanced* electives in the major language, two advanced* electives in the minor language.

30.170, 171, Survey of English Literature I and II; 23.101, 102, Western Civilization I and II; two additional History electives.

Distribution requirements.

Bachelor of Science

Twelve advanced* electives in the major language including two conversation and composition courses; six advanced* electives in the minor language including two conversation and composition courses.

23.101, 102 Western Civilization I and II.

*Courses beyond the intermediate level.

PHILOSOPHY**Bachelor of Arts**

26.110, 111, Great Philosophers I and II; 26.150, Introduction to Logic *or* 26.151, Symbolic Logic; 26.152, Theory of Knowledge *or* 26.153, Metaphysics *or* 26.155, Moral Philosophy; one Philosophy seminar; eight Philosophy electives.

Foreign language and distribution requirements.

Bachelor of Science

26.110, 111, Great Philosophers I and II; 26.150, Introduction to Logic, *or* 26.151, Symbolic Logic; 26.152, Theory of Knowledge, *or* 26.153, Metaphysics *or* 26.155, Moral Philosophy; one Philosophy seminar; eight Philosophy electives.

PHYSICS

11.117, 118, 119, 127, 128, Physics for Science Majors I, II, III, IV, and V; 11.124, 125, Physics Laboratory for Science Majors I and II; three upper-level Physics lecture courses; three upper-level Physics laboratory courses.

10.181, 182, 183, Calculus I, II and III; 10.184, 185, Calculus and Linear Methods I and II; one advanced Mathematics elective.

Foreign language and distribution requirements.

11.117, 118, 119, 127, 128, Physics for Science Majors I, II, III, IV, and V; 11.124, 125, Physics Laboratory for Science Majors I and II; 11.200, Intermediate Mechanics; 11.201, Theoretical Mechanics or 11.221, Wave Motion and Optics; 11.211, 212, Electricity and Magnetism I and II; 11.220, Thermodynamics and Kinetic Theory; 11.208, Mathematical Physics; 11.230, Modern Physics; three upper-level Physics laboratory courses.

10.181, 182, 183, Calculus I, II, and III; 10.184, 185, Calculus and Linear Methods I and II; two advanced Mathematics electives; five additional electives from the following fields: Physics, Mathematics, Chemistry, Engineering, Biology.

Bachelor of Arts

Bachelor of Science

POLITICAL SCIENCE

22.110, Introduction to Politics; 22.111, Introduction to American Government; 22.112, Introduction to International Relations; 22.113, Introduction to Comparative Politics; 22.261, Public Administration; 22.270, Political Theory, or 22.273 and 22.274*, Political Thought I and II; 22.280**, Scope and Methods of Political Science; five Political Science electives.

Six Social Science electives selected from at least three of the following areas: Anthropology, Economics, History, Psychology, Sociology.

Foreign language and distribution requirements.

22.110, Introduction to Politics; 22.111, Introduction to American Government; 22.112, Introduction to International Relations; 22.113, Introduction to Comparative Politics; 22.261, Public Administration; 22.270, Political Theory, or 22.273, 274* Political Thought I and II; 22.280, Scope and Methods of Political Science; 22.281, Quantitative Methods in Political Science; 22.286, Research seminar; five Political Science electives.

Six Social Science electives selected from at least three of the following areas: Anthropology, Economics, History, Psychology, Sociology.

Strongly recommended: 10.104, 10.105, Fundamentals of Mathematics; 10.211, 212, 213, Fortran and Forgo I, II and III.

*22.274, Political Thought II, will count as an elective.

**22.280 is a requirement for the B.A. degree beginning with classes 1977A, 1977B, 1976C.

Bachelor of Arts

Bachelor of Science

POLITICAL SCIENCE

Concentration in Public Administration

Bachelor of Science

22.110, Introduction to Politics; 22.111, Introduction to American Government; 22.261, Public Administration; 22.270, Political Theory; 22.280, Scope and Methods of Political Science; 22.281, Quantitative Methods in Political Science; 22.263, Public Management; 22.266, Public Personnel Administration; 22.267, Public Budgeting; 22.269, Government Accounting; 22.289, Public Administration Practicum; 93.113, Computer Science; two Public Administration electives.

Six Social Science electives selected from at least three of the following areas: Anthropology, Economics, History, Psychology, Sociology.

PSYCHOLOGY

Bachelor of Arts

19.105, 106, Foundations of Psychology I and II; 19.120, 121, Statistics in Psychology I and II; 19.164, Learning and Motivation; two of the following: 19.138, Experimental Personality, 19.162, Sensation and Perception Laboratory I, 19.165, Learning Laboratory, 19.181, Practicum in Physiological Psychology; 19.290, Directed Study; one of the following courses: 19.150, Sensation and Perception, 19.178, Physiological Basis of Psychology; plus seven Psychology electives.

Foreign language and distribution requirements.

Bachelor of Science

19.105, 106, Foundations of Psychology I and II; 19.120, 121, Statistics in Psychology I and II; 19.164, Learning and Motivation; two of the following: 19.138, Experimental Personality, 19.162, Sensation and Perception Laboratory I, 19.165, Learning Laboratory, 19.181, Practicum in Physiological Psychology, 19.290, Directed Study; one of the following: 19.150, Sensation and Perception, 19.178, Physiological Basis of Psychology; one of the following: 19.278, Ethical Problems of Psychology, 19.279, Impact of Psychology on Society, 19.280, Senior Seminar; five Psychology electives.

Six courses in Mathematics or Science (Biology, Chemistry, or Physics).

SOCIOLOGY- ANTHROPOLOGY

Concentration in Sociology

21.100, Introduction to Sociology; 21.239, Introduction to Statistical Analysis; 21.240, 241, Research Methods I and II; 21.280, 281, Social Theory I and II; one of the following: 21.207, Social Psychology, 21.111, American Society, 21.120, Sociology of the Family, or 21.145, Urban Society; two of the following: 21.215, Collective Behavior, 21.231, Sociological Theories of Crime, 21.245, Community Analysis, 21.255, Sociology of Formal Organizations, 21.265, Sociology of Occupations; one of the following: 21.250, Political Sociology, 21.260, Social Stratification, or 21.270, Social Change.

20.100, Principles of Social Anthropology; Anthropology elective; six electives in the Social Sciences other than Sociology-Anthropology.

Foreign language and distribution requirements.

21.100, Introduction to Sociology; 21.239, Introduction to Statistical Analysis; 21.240, 241, Research Methods I and II; 21.280, 281, Social Theory I and II; one of the following: 21.107, Social Psychology, 21.111, American Society, 21.120, Sociology of the Family, or 21.145, Urban Society; two of the following: 21.215, Collective Behavior, 21.231, Sociological Theories of Crime, 21.245, Community Analysis, 21.255, Sociology of Formal Organizations, 21.265, Sociology of Occupations; one of the following: 21.250, Political Sociology, 21.260, Social Stratification, or 21.270, Social Change.

20.100, Principles of Social Anthropology; Anthropology elective; six electives in the Social Sciences other than Sociology-Anthropology.

Approved five-course specialization.

Bachelor of Arts

Bachelor of Science

Concentration in Anthropology

20.100, Principles of Social Anthropology; ten Anthropology courses, including three from the following: 20.130, Language and Culture, 20.135, Individual and Culture, 20.140, Evolution and Society, 20.160, Anthropology of the Family, 20.170, Culture in Transition, 20.210, Tribal Society and Cultures, 20.214, Peasant Society and Culture.

21.100, Introduction to Sociology; Sociology elective; six electives in the Social Sciences other than Sociology-Anthropology.

Foreign language and distribution requirements.

Bachelor of Arts

Bachelor of Science

20.100, Principles of Social Anthropology, ten Anthropology courses, including three from the following: 20.130, Language and Culture, 20.135, Individual and Culture, 20.140, Evolution and Society, 20.160, Anthropology of the Family, 20.170, Culture in Transition, 20.210, Tribal Society and Culture, 20.214, Peasant Society and Culture.

20.100, Introduction to Sociology; Sociology elective; six electives in the Social Sciences other than Sociology-Anthropology.

Approved five-course specialization.

SPEECH COMMUNICATIONS

Group and Public Communication Concentration

Bachelor of Arts

29.105, Argumentation and Debate; 29.106, Speech Fundamentals; 29.123, Propaganda; 29.119, Explorations in Communication; 29.129, Introduction to Communication Skills; 29.115, Theories of Persuasion; 29.116, Persuasive Techniques; 29.107, Interpersonal Communications; 29.117, Group Discussion; seven Speech electives.

22.101, Introduction to Political Science I or 22.102, Introduction to Political Science II; 19.106, Foundations of Psychology II or 21.100, Introduction to Sociology; 19.130, Social Psychology.

Foreign language and distribution requirements.

Personal Performance Concentration

Bachelor of Arts

29.106, Speech Fundamentals; 29.110, Voice and Articulation; 29.129, Introduction to Communication Skills or 29.119, Explorations in Communication; 29.111, Oral Interpretation; 29.108, Business and Professional Speaking; 29.105, Argumentation and Debate; 29.112, Advanced Oral Techniques or 29.114, Advanced Oral Interpretation; 29.118, Communications in Education or 29.115, Theories of Persuasion; 29.116, Persuasive Techniques, or Reader's Theatre; 29.290, Directed Study in Speech Communications; Speech elective.

Foreign language and distribution requirements.

College of Nursing

ASSOCIATE DEGREE PROGRAM

19.201, Psychology of Abnormal Behavior; and 81.101, Medical-Surgical Nursing or 82.101, Maternal and Child Health. **Quarter 4**

21.100, Introduction to Sociology; and 81.101, Medical-Surgical Nursing or 82.101, Maternal and Child Health. **Quarter 5**

30.114, Introduction to Literature; 90.254, Professional Development for Nurses; 81.102, Medical-Surgical Nursing or 83.101, Psychiatric Nursing; elective. **Quarter 6**

22.177, American Political Process; 81.102, Medical-Surgical Nursing or 83.101, Psychiatric Nursing; elective. **Quarter 7**

ASSOCIATE DEGREE PROGRAM FOR LICENSED PRACTICAL NURSES

21.100, Introduction to Sociology; 22.177, American Political Process or elective; 81.102, Medical-Surgical Nursing or 82.101, Maternal and Child Health or 83.101, Psychiatric Nursing. **Quarter 4**

30.114, Introduction to Literature; 90.254, Professional Development for Nurses; History or an elective; 81.102, Medical-Surgical Nursing or 82.101, Maternal and Child Health or 83.101, Psychiatric Nursing. **Quarter 5**

81.102, Medical-Surgical Nursing or 82.101, Maternal and Child Health; elective. **Quarter 6**

BACHELOR'S DEGREE PROGRAM

18.120, Basic Microbiology; 18.125, Human Physiology; 19.105, Foundations of Psychology I; 80.204, Nursing - Universal Needs. **Quarter 4**

18.126, Human Physiology; 19.106, Foundations of Psychology II; 20.100, Principles of Social Anthropology; 80.205, Nursing - Common Problems I. **Quarter 5**

19.141, Growth and Development I; 21.100, Introduction to Sociology; 80.206, Nursing - Common Problems II. **Quarter 6**

19.130, Social Psychology; 19.142, Growth and Development II; 81.102, Medical-Surgical Nursing or 82.201, Maternal and Child Health or 83.201, Psychiatric-Mental Health Nursing. **Quarter 7**

81.201, Medical-Surgical Nursing or 82.201, Maternal and Child Health or 83.201, Psychiatric-Mental Health Nursing; Humanities elective; elective. **Quarter 8**

- Quarter 9** 81.201, Medical-Surgical Nursing or 82.201, Maternal and Child Health or 83.201, Psychiatric-Mental Health Nursing; Humanities elective; elective.
- Quarter 10** 84.201, Public Health Nursing; two electives.
- Quarter 11** 85.201, Contemporary Nursing; elective.

College of Pharmacy and Allied Health Professions

PHARMACY

12.144, Organic Chemistry; 11.171, Physics for the Life Sciences I; 19.105, Foundations of Psychology I; 39.115, Principles and Problems of Economics.	Quarter 4
12.145, Organic Chemistry; 11.175, Physics for the Life Sciences III; 21.100, Introduction to Sociology; 29.108, Business and Professional Speaking.	Quarter 5
71.261, Pharmacy I; 73.203, Anatomy-Physiology; 93.151, General Biochemistry; elective.	Quarter 6
18.120, Basic Microbiology; 71.262, Pharmacy II; 72.241, Introduction to Therapeutics; 73.204, Anatomy-Physiology.	Quarter 6A
72.230, Drug Analysis; 72.242, Chemical Pharmacology I; 73.223, Clinical Biochemistry; elective.	Quarter 7
71.263, Pharmacy III; 73.245, Introduction to Pathology; 72.243, Chemical Pharmacology II; professional elective.	Quarter 8
71.264, Pharmacy IV; 72.244, Chemical Pharmacology III; 73.247, Toxicology; professional elective.	Quarter 9
65.218, Public Health; 71.265, Professional Practice I; 72.243, Chemical Pharmacology II; professional elective.	Quarter 10
71.245, Pharmacy Administration I; 71.266, Professional Practice II; 72.244, Chemical Pharmacology III; 90.251, Placement Techniques; professional elective.	Quarter 10A
71.253, Clinical Pharmacy; 71.267, Professional Practice III; professional elective.	Quarter 11

FORSYTH DENTAL - ASSOCIATE DEGREE PROGRAM

30.113, Freshman Writing.	Quarter 4
30.114, Introduction to Literature.	Quarter 4A
21.100, Introduction to Sociology.	Quarter 5

MEDICAL LABORATORY SCIENCE

- Quarter 4** All take 12.144, Organic Chemistry; 18.158, Vertebrate Physiology or 73.203, Anatomy and Physiology; Modern Language or Humanities elective; 87.102, Basic Medical Laboratory Hematology and 87.103, Basic Medical Laboratory Immunohematology or 87.101, Basic Medical Laboratory Science.
- Quarter 5** All take 12.145, Organic Chemistry; 18.159, Vertebrate Physiology or 73.204, Anatomy and Physiology; Modern Language or Humanities elective; 87.105, Basic Medical Laboratory Chemistry and Instrumentation; 12.171, Analytical Chemistry or elective.
- Quarter 6** All take 18.135, Genetics and Development Biology; 11.117, Physics for Science Majors and 11.124, Physics Laboratory for Science Majors or 11.171, Physics for the Life Sciences I and 11.173, Physics Laboratory for the Life Sciences I; 87.102, Basic Medical Laboratory Hematology; 87.103, Basic Medical Laboratory Immunohematology or Social Science elective or 12.171, Analytical Chemistry; 87.120, Communications in the Health Sciences.
- Quarter 7** 11.119, Physics for Science Majors III and 11.125, Physics Laboratory for Science Majors II or 11.172, Physics for the Life Sciences II and 11.174, Physics Laboratory for the Life Sciences II; 18.136, Cell Biology; Social Science elective; 18.220, General Microbiology or 87.104, Basic Medical Laboratory Science or 12.171, Analytical Chemistry or 87.105, Basic Medical Laboratory Science.
- Quarter 8** Option I take 18.158, Vertebrate Physiology or 73.203, Anatomy and Physiology; 12.171, Analytical Chemistry or elective; 87.101, Basic Medical Laboratory Science or 87.102, Basic Medical Laboratory Hematology and 87.103, Basic Medical Laboratory Immunohematology or elective; Biology elective.
Option II take 87.112, Hematology and Immunohematology Applied Study (at Hospital); 87.202, Hematology and Immunohematology and 87.203, Medical Immunology and Serology; 87.226, Medical Laboratory Science Education;
OR
87.115, Medical Laboratory Chemistry Applied Study (at Hospital); 87.204, Medical Parasitology; 87.205, Clinical Chemistry; 87.121, Quality Control.
- Quarter 9** Option I take elective or 12.171, Analytical Chemistry; 18.159, Vertebrate Physiology or 73.204, Anatomy and Physiology or elective; 18.220, General Microbiology; 87.105, Basic Medical Laboratory Chemistry and Instrumentation.
Option II take 87.111, Medical Microbiology Applied Study (at Hospital); 87.201, Pathogenic Microbiology; 87.221, Medical Laboratory Management; 87.190, Undergraduate Research.
- Quarter 10** 87.112, Hematology and Immunohematology Applied Study (at Hospital); 87.202, Hematology and Immunohematology; 87.203, Medical Immunology and Serology; 87.226, Medical Laboratory Science Education;

OR

87.115, Medical Laboratory Chemistry Applied Study (at Hospital); 87.204, Medical Parasitology; 87.205, Clinical Chemistry; 87.121, Quality Control.

87.111, Medical Microbiology Applied Study (at Hospital); 87.201, Pathogenic Microbiology; 87.221, Medical Laboratory Management; 87.190, Undergraduate Research.

Quarter 11

MEDICAL RECORD ADMINISTRATION

18.114, Functional Human Anatomy I; 21.100, Introduction to Sociology; 23.101, Western Civilization or 39.115, Principles and Problems of Economics; Modern Language or elective.

Quarter 4

18.115, Functional Human Anatomy II; 18.121, Basic Microbiology; 21.101, Introduction to Sociology or Modern Language or elective; 23.102, Western Civilization or 39.116, Principles and Problems of Economics.

Quarter 5

73.111, Drugs - Uses and Actions; 86.107, Medical Terminology; 86.112, Foundations of Medical Science I; 29.100, Public Speaking; elective.

Quarter 6

86.102, Hospital Law; 86.113, Foundations of Medical Science II; 86.151, Medical Record Science I; elective.

Quarter 7

45.209, Organizational Behavior I; 86.152, Medical Record Science II; 86.252, Applied Medical Record Science - Directed Study I; Statistics.

Quarter 8

45.210, Organizational Behavior II; 86.153, Medical Record Science III; 86.253, Applied Medical Record Science - Directed Study II; elective.

Quarter 9

86.154, Medical Record Science IV; 86.155, Organization and Management - Medical Record Department; 86.254, Applied Medical Record Science; 86.157, Seminar in Medical Records; Introduction to Computers.

Quarter 10

86.156, Organization and Management - Medical Record Department; 45.261, Interpersonal Relations; Medical Computer Applications; 87.226, Health Science Education; and Hospital Organization and Management.

Quarter 11

RESPIRATORY THERAPY

73.111, Drugs - Uses and Actions; 86.112, Foundations of Medical Science I; 86.184, Procedures of Respiratory Therapy I; 86.284, Directed Applied Study - Respiratory Therapy I.

Quarter 4

86.113, Foundations of Medical Science II; 86.185, Procedures of Respiratory Therapy II; 86.285, Directed Applied Study II - Respiratory Therapy II; liberal elective.

Quarter 5

- Quarter 6** 86.174, Health, Disease, and Disability I; 86.186, Respiratory Diagnostics; Directed Applied Study III; elective.
- Quarter 7** 86.175, Health, Disease, and Disability II; 86.198, Procedures in Respiratory Therapy V; 86.524, Methods and Materials in Public Health Education; elective.

Course Numbering Program

The number to the left of the decimal point indicates the academic department offering the course. The three digits after the decimal point differentiate the courses within the department.

Accounting	41.	Graphic Science	09.
Afro-American Studies	25.	Health Education	65.
Allied Health Professions	86.-87.	History	23.
Anthropology	20.	Industrial Engineering	05.
Art	27.	Interdisciplinary	93.
Biology	18.	Italian	35.
Business General	49.	Journalism	38.
Chemical Engineering	04.	Latin	36.
Chemistry	12.	Management	45.
Civil Engineering	01.	Marketing	43.
Cooperative	90.	Mathematics	10.
Criminal Justice	92.	Mechanical Engineering	02.
Drama, Speech, and Communications	29.	Military Science	91.
Earth Sciences (Geology)	16.	Music	28.
Economics	39.	Nursing	80.-84.
Education Foundation	50.	Pharmacy	71.-73.
Education Instruction	51.	Philosophy & Religion	26.
Education Reading	54.	Physical Education	60.-62.
Education Speech and Hearing	55.	Physical Therapy	64.
Electrical Engineering	03.	Physics	11.
English	30.	Pol. Sci.	22.
Entrepreneurship and New Venture Management	44.	Psychology	19.
Finance and Insurance	31.	Recreation	63.
French	33.	Russian	34.
German	46.	Small Business Management	47.
		Sociology	21.
		Spanish	32.
		Transportation	48.

Classes at Northeastern University are scheduled in different modules.

In assessing quarter weights for courses, the following statement applies:

One quarter hour of credit is equal to 50 minutes of instruction per week, plus two hours of preparation.

Civil Engineering

01.101 Special Topics (Prereq. Outstanding academic performance) 4 Q.H.

An individual effort in an area within the field of civil engineering selected by the student and adviser with approval by the Department, resulting in a definitive report. Work to be performed in both Quarters 10 and 11, equivalent to 2 quarter hours each quarter. Final grade to be awarded in Quarter 11.

Staff

Fall, Winter, and Spring Qtrs.

01.105 Civil Engineering Systems (Prereq. 10.154) 4 Q.H.

Introduction to system synthesis and optimization techniques. The course is designed primarily for civil engineering students interested in planning and management in the fields of construction, transportation, environmental and structural engineering. Topics include: calculus method, linear programming, network analysis, critical path scheduling, and dynamic programming.

Profs. Ossenbruggen and Scranton

Spring and Summer Qtrs.

01.106 Applied Probability Theory for Civil Engineers

(Prereq. 10.154) 4 Q.H.

The basic elements of probability theory and their use via the solution of various civil engineering problems encountered in fluid mechanics, construction management, structures, transportation, etc. Probability of events, random variables and distribution, derived distribution, expectation, and common probability models.

Prof. Ossenbruggen

Fall and Winter Qtrs.

01.116 Engineering Measurements

4 Q.H.

The methods and instruments utilized to perform engineering measurements; errors and reliability; propagation of errors in computing; application to problems of land surveying, route surveying, and topographical, hydrographical and construction surveys.

Profs. Meserve, Lenney, and Mr. Alberti

Fall and Summer Qtrs.

01.117 Engineering Measurements Laboratory

2 Q.H.*

To be taken simultaneously with 01.116. Fieldwork problems to expand and reinforce the lecture material of 01.116.

Fall and Summer Qtrs.

01.120 Fluid Mechanics I

(Prereq. 01.140) 4 Q.H.

Fluid properties; fluid statics; flow concepts including conservation of mass, energy and momentum; closed conduit flow including friction; dimensional analysis; introduction to open-channel flow.

Profs. Branagan, Horn, and Lenney

Spring and Summer Qtrs.

01.122 Hydraulic Engineering

(Prereq. 01.193) 4 Q.H.

Principles of hydrology, hydraulics of open-channel flow, design of water distribution systems, design of sanitary sewer and storm drainage systems, hydraulic machinery.

Profs. Branagan, Horn, and Meserve

Fall and Winter Qtrs.

01.124 Flow of Fluids (*Non-Civil Eng. majors only*)

(Prereq. 02.165) 4 Q.H.

Fluid properties, fluid states, closed conduit flow, dimensional analysis, water distribution systems, open-channel flow, and introduction to sanitary sewer design.

Profs. Horn, Lenney, and Cahoon

Fall and Winter Qtrs.

01.134 Transportation Engineering

(Prereq. 01.105) 4 Q.H.

The current technology and status of the various systems of transportation of people and materials, including highways, urban mass transit, railroads, air and water transport, conveyors and pipelines. Civil engineering considerations of planning, design, cost, construction, research needs, and environmental factors.

Profs. Ossenbruggen and Scranton

Spring Qtr.

01.135 Construction Engineering

4 Q.H.

Organizational concepts of construction entities; interrelationship of engineer, architect, and contractor; cost management systems; planning and analysis of estimates; scheduling work utilizing computer methods; management and supervision of construction operations; quality control.

Profs. Neff and Leet

Spring Qtr.

01.136 Highway Engineering

4 Q.H.

A course in highway design based upon traffic conditions. Elements of intersection design, geometrics of highway design, materials, permanent design, and construction are considered.

Prof. Woelfl

Spring Qtr.

01.140 Structural Mechanics I

(Prereq. Freshman Physics) 4 Q.H.

Statics of particles and rigid bodies in two and three dimensions. Analysis of internal forces in trusses and beams. Centroids and centers of gravity of lines, area, and volumes. Moments of inertia of areas and masses.

Profs. Lenney, Namyet, and Woelfl

Winter and Spring Qtrs.

01.141 Structural Mechanics II

(Prereq. 01.140) 4 Q.H.

Review of statics. Shear and bending moment diagrams. Mechanical properties of materials.

Analysis of members subjected to torsion and axial loads. Analysis of beams in shear and bending; elastic and plastic theory. Compound stresses.

Profs. Lenney, Namyet, and Woelfl

Fall and Winter Qtrs.

01.142 Structural Mechanics III

(Prereq. 01.141) 4 Q.H.

Transformation of stress and strain. Column buckling and theories of failure. Review of forces in beams and trusses. Influence lines for statically determinate structures. Deflection of trusses, beams, and frames. Utilizing the method of virtual work and moment-area propositions.

Profs. Lenney, Namyet, and Leet

Spring and Summer Qtrs.

01.143 Structural Analysis I

(Prereq. 01.142) 4 Q.H.

Analysis of statically indeterminate structures utilizing the slope-deflection equations and moment-distribution. The system approach to flexibility using matrix notation is also treated.

Profs. Khetarpal, Spencer, and Scranton

All Qtrs.

01.144 Structural Analysis II

(Prereq. 01.143) 4 Q.H.

The analysis of all classes of structures by use of the system approach in stiffness and member approach encompassing both flexibility and stiffness completes the matrix analysis of structures. Influence lines for statically indeterminate structures.

Profs. Lenney and Scranton

All Qtrs.

01.145 Structural Analysis III

(Prereq. 01.144) 4 Q.H.

Approximate methods of structural analysis. Analysis of cables. Elementary structural dynamics. Analysis of membranes and shells. Structures in architecture.

Profs. Namyet, Lenney, and Leet

Spring Qtr.

01.150 Concrete Design I

(Prereq. 01.141) 4 Q.H.

Design of reinforced concrete elements by the working stress and ultimate strength methods; bending members and short columns.

Profs. Khetarpal, Leet, and Namyet

All Qtrs.

01.152 Concrete Design II

(Prereq. 01.150) 4 Q.H.

Design of reinforced concrete structural systems including continuous beams, frames, floors, and roofs. Prestressed concrete design theory and practice. Long columns of reinforced concrete.

Profs. Khetarpal and Leet

Fall and Winter Qtrs.

01.160 Structural Design I

(Prereq. 01.141) 4 Q.H.

Design of steel members subjected to tension, compression, bending, and combinations of loading. Introduction to plastic analysis and design. Design of connections, braced frames, and rigid frames.

Profs. Cahoon, Namyet, and Leet

Fall and Winter Qtrs.

01.161 Structural Design II

(Prereq. 01.160) 4 Q.H.

Design of steel plate girders, bridges, composite construction in bridges and buildings. Additional types in plastic analysis and design. Design for lateral loads on high-rise buildings.

Profs. Cahoon and Leet

Spring Qtr.

01.174 Foundation Engineering

(Prereq. 01.178, 01.179) 4 Q.H.

Evaluation of site survey and boring data for foundations. Determination of soil bearing capacity, design of spread footings, pile and caissons foundations. Design of retaining walls and braced sheeting. Selected topics on settlements and slope stability.

Profs. Jaworski and Leet

Spring Qtr.

01.175 Geotectonics

(Prereq. 01.180) 4 Q.H.

Origin and composition of the earth's crust, identification of soil classes, engineering properties of soils, clay and rock mineralogy, geological mapping and exploration, earth movements, weathering, transportation of materials by wind and water.

Profs. Jaworski and Horn

Fall and Winter Qtrs.

01.178 Soil Mechanics

(Prereq. 01.140) 4 Q.H.

Soil classification, soil-water phase relationships. Introduction to ground water seepage, consolidation theory, strength properties of soils stress distributions in soils due to surface

loads, lateral earth pressures, bearing capacity of shallow footings. Laboratory tests to identify soils, and to determine physical properties and soil behavior.

Prof. Jaworski

All Qtrs.

01.179 Soil Mechanics Laboratory

2 Q.H.*

To be taken simultaneously with 01.178. Laboratory exercises in soil classification, seepage, shear strength, consolidation, and triaxial testing.

All Qtrs.

01.180 Materials

(Prereq. Freshman Chemistry) 4 Q.H.

The fundamentals of the behavioral classification of materials, such as metals, polymer, colloids, glasses, and composites. Other topics will include the significance of phase transformations, visco-elastic behavior, and corrosion mechanisms.

Prof. Gregory and Woelfl

Spring and Summer Qtrs.

01.182 Experimental Methods in Engineering Mechanics

(Prereq. 01.141) 4 Q.H.*

Survey of experimental techniques and instrumentation; experimental determination of basic material properties for concrete, wood, metals, and other engineering materials. Introduction to model analysis.

Prof. Woelfl and Mr. Alberti

Spring and Summer Qtrs.

01.193 Environmental Engineering I

(Prereq. 01.122) 4 Q.H.

An introduction to the nature and effects of environmental quality, including water quality, water supply, water and wastewater treatment, air pollution, and solid waste management, team-taught by various members of the staff lecturing in their specialized areas. Interrelationships between the air-water-land complex are developed. The course emphasizes the engineering approach to the management of the environment. Open to *all* engineering students.

Staff

All Qtrs.

(Civil Eng. majors) Spring and Summer Qtrs.

01.194 Environmental Engineering II

(Prereq. 01.193) 4 Q.H.

A continuation of Environmental Engineering I dealing with the design details of various environmental projects. Topics include development of ground and surface water supplies, water and wastewater disinfection methods, design and operation of treatment plants, and industrial waste disposal. Other current engineering projects are also included.

Prof. Meserve and Blanc

Spring Qtr.

01.196 Environmental Design

(Prereq. 01.223, 01.194) 4 Q.H.*

A design and laboratory course in environmental engineering. In alternating laboratory sessions the student is assigned an individual design project selected from the areas of water supply and treatment, wastewater collection and disposal, and solid waste and air pollution control. (2-3 hour Lab. sessions per week.)

Staff

Spring Qtr.

01.197 Survey of Environmental Problems (*Enrollment limited to non-engineers*) 4 Q.H.

Major topics: water, wastewater, air pollution, and solid waste, will be covered in the following format: What is the problem? Why does it exist? Effects of this condition. Abatement procedures. The interrelationship of environmental conditions is stressed and ecological considerations discussed.

Prof. Wei and Blanc

All Qtrs.

01.224 Environmental Chemistry

(Freshman Chemistry) 4 Q.H.

Analytical chemistry principles are studied with reference to environmental engineering applications. The chemistry of processes such as coagulation, iron and manganese removal, ion exchange, softening, and disinfection are included. The principles of spectroscopy and polarography are also discussed, in addition to gas transfer, oxidation and reduction, and radiation chemistry. Reaction rates with reference to environmental engineering applications

*Including lab.

such as BOD are studied, as well as topics in organic chemistry and instrumental analysis. (3 Lecture and 3 Lab. hours per week.)

Profs. Cochrane and Wei

Fall and Winter Qtrs.

01.259 Air Pollution

4 Q.H.

Theory and practice related to engineering management of air resources, microclimate and dispersion of pollutants, atmospheric chemistry, air pollution instrumentation, control of gaseous and particulate emissions, and design of air pollution control systems. Biological and chemical aspects of air pollution with emphasis on the toxicological aspects of the environment, physiological effects of aerosols, analysis of organic and inorganic constituents of the atmosphere, and rationale for establishment of air quality criteria and standards.

Prof. Gregory

Spring Qtr.

Mechanical Engineering

02.116 Dynamics (*Not open to Mech. Eng. majors*)

(Prereq. 01.140) 4 Q.H.

Kinematics and kinetics of particles and rigid bodies, including work and energy.

Profs. Phalen and Yorra

Fall and Winter Qtrs.

02.130 Thermodynamics I

4 Q.H.

Thermodynamics is the study of the concepts of energy and energy interactions between material systems through the basic laws of thermodynamics. The concepts of energy are discussed, and the first law for the conservation of energy is set forth. A system is described, and its thermodynamic state is defined in terms of properties of substances. An energy analysis of various thermodynamic systems is presented in terms of entropy and the second law. Some consequences of the second law are discussed.

Prof. Zelinski

All Qtrs.

02.131 Thermodynamics II

(Prereq. 02.130) 4 Q.H.

The general thermodynamic relationships between properties of a substance are developed. The equation of state is discussed for liquids, gases, and magnetic substances. The characteristics of power systems and refrigeration systems are presented. The thermodynamics of nonreacting mixtures of gases, liquids, and solids is set forth with the development of the chemical potential and phase relationships included. Reacting mixtures are studied, and the conditions for chemical equilibrium are outlined.

Prof. Foster

All Qtrs.

02.132 Introduction to Combustion

(Prereq. 02.130) 4 Q.H.

The basic knowledge necessary to understand combustion phenomena and its application to selected combustion problems. Fundamental principles of thermochemistry, kinetics of chemical reactions, and transport properties of gases are given. The conservation equations for reacting mixtures are discussed. Theories of the combustion of liquid droplets, laminar diffusion flames, and premixed laminar flames are presented.

Prof. Zelinski

Spring Qtr.

02.134 Direct Energy Conversion

(Prereq. 02.130) 4 Q.H.

Direct energy conversion is concerned with means for converting heat directly into electrical energy. Included among the devices which accomplish this are magnetohydrodynamic power generators, thermionic emission converters, and fuel cells. The operating principles of these engines are presented, and performance calculations are made. A unified theory of energy conversion is discussed based upon the concepts of irreversible thermodynamics.

Prof. Zelinski

Not offered 1974-75

02.145 Design Fundamentals

(Prereq. 02.167) 4 Q.H.

Engineering design analysis of dynamically loaded machine elements. Stress concentration, contact and impact stresses, thorough treatment of fatigue factors in design (combined loading and statistical considerations). Environmental factors in design, creep, temperature

and atmosphere.

Prof. Rossettos

Fall and Winter Qtrs.

02.146 Mechanical Engineering Design

(Prereq. 02.145) 4 Q.H.

Project, using system approach, which involves all aspects of mechanical engineering: mechanics, thermodynamics, heat transfer, etc. This course is intended to correlate previous courses in optimal design of various mechanical systems. Problem areas investigated may include friction and power transmission devices, hydraulic systems, etc.

Profs. Blanchard and Mills

Spring Qtr.

02.147 Engineering Design

(Prereq. 02.167) 4 Q.H.

Intended for students who take only one course in design. Topics covered are stress concentration, fatigue and impact loading, lubrication, friction, and power transmission devices and optimum design.

Prof. Mills

Spring Qtr.

02.148 Design and Analysis (*Open to all seniors*)

4 Q.H.

An interdisciplinary course. Project either analytical or experimental supervised by an interdisciplinary faculty. Examples of projects (e.g., trash disposal, underwater search and rescue).

Prof. Blanchard

Fall, Winter, and Spring Qtrs.

02.149 Engineering Analysis

4 Q.H.

Equilibrium problems in systems with a finite number of degrees of freedom (i.e., as opposed to a continuous system), extremum techniques, methods of solving the resulting algebraic equations, examples of physical situations, equilibrium stresses in elastic structures, steady state temperature distribution, steady subsonic flow, electrostatic fields, and steady flow of direct and alternating current.

Profs. Long and Rossettos

Not offered 1974-75

02.150 Heat Transfer I

4 Q.H.

Modes of heat transfer; steady state and transient conduction, one and two dimensions; exact, numerical and graphical techniques; electrical analogy; natural and forced convection, laminar and turbulent; radiation; change of phase heat transfer; condensation and boiling; heat exchangers.

Prof. Bowman

Spring and Summer Qtrs.

02.155 Fluid Mechanics I

(Prereq. 02.167) 4 Q.H.

Differential and integral formulations of mass conservation and the equations of motion and energy; control volume applications; elements of one-dimensional, steady compressible flow; introductions to boundary layer theory; dimensional analysis and similitude.

Prof. Nelson

Spring and Summer Qtrs.

02.156 Fluid Mechanics II

(Prereq. 02.155) 4 Q.H.

Velocity potential and stream functions; circulation and Kelvin's theorem; two-dimensional, steady irrotational incompressible flow; Karman-Pohlhausen method applied to two-dimensional boundary layers.

Prof. Nelson

Not offered 1974-75

02.157 Fluid Machinery

(Prereq. 02.155) 4 Q.H.

General principles of turbomachines; similitude and performance curves; specific speed; consideration of turbines, centrifugal pumps and impressors, axial pumps and compressors, regenerative pumps and turbines.

Prof. Nelson

Not offered 1974-75

02.163 Mechanics (*Open to Elect. Eng. majors*)

4 Q.H.

The kinematics and kinetics of rigid bodies. Instantaneous equations of motion, work and energy, impulse and momentum.

All Qtrs.

02.164 Mechanics

5 Q.H.

Statics, kinematics, and kinetics for transfer students.

Mr. Perl

Fall Qtr.

02.165 Mechanics I

4 Q.H.

The concept and vector representation of force, moment of force, position, displacement, velocity, and acceleration. Equivalent force systems. System modeling, particles and rigid bodies, free body diagrams. Equilibrium; the kinematics and kinetics of particles.

Profs. Dunn and Long

All Qtrs.

02.166 Mechanics III

(Prereq. 02.165) 4 Q.H.

Continuation of 02.165, Mechanics I. The kinematics and kinetics of rigid bodies. Instantaneous equations of motion, work and energy, impulse and momentum.

Profs. Dunn and Long

Fall and Winter Qtrs.

02.167 Mechanics II

(Prereq. 02.165) 4 Q.H.

Stress and strain in a solid and their transformation properties; stress-strain relation for the linear elastic solid; yield criteria; determination of the stress and deformation of simple members under axial, torsional, and flexural loadings.

Profs. Dunn and Long

Spring and Summer Qtrs.

02.168 Mechanics IV

(Prereq. 02.167) 4 Q.H.

This course, dealing with the stress and deformation of slender members under flexural loadings, extends considerably beyond the simple shapes and loadings treated in 02.167. Stresses in symmetric members transmitting both shear and bending; bending of un-symmetrical beams; deflections due to bending by a variety of techniques; treatment of statically indeterminate problems; elastic stability of flexible columns.

Prof. Yorra

Fall and Winter Qtrs.

02.169 Intermediate Strength of Materials

(Prereq. 02.167) 4 Q.H.

Application of the principles of the mechanics of elastic solids covered in 02.167 to a wide variety of situations of engineering interest. Energy methods; determination of the deformation and stress in curved members; pressure vessels, beams on elastic foundations, contact stresses; introduction to plastic analysis.

Prof. Phalen

Not offered 1974-75

02.171 Mechanical Vibrations

(Prereq. 02.166) 4 Q.H.

One, two, and multi-degrees of freedom systems using classical, energy, Laplace, mobility, matrix, and computer techniques.

Prof. Blanchard

Not offered 1974-75

02.172 System Analysis and Control

(Prereq. 02.166) 4 Q.H.

Theoretical background for analyzing and designing a linear control system. System modeling, linear approximations and their limitations, transfer functions, and block diagramming. Applications of the Laplace transform. Transient and frequency response. Stability, frequency domain, and root locus techniques.

Prof. Chu

Fall and Winter Qtrs.

02.174 Design for Space Applications

(Prereq. 02.166) 4 Q.H.

Topics covered are: astronomical coordinate systems, gravitational and nongravitational forces on spacecraft, the motion of artificial satellites, and observational techniques. The feasibility of voyages outside the solar system, interplanetary and interstellar navigation, and the hazards of space are discussed.

Prof. Yorra

Spring Qtr.

02.175 Analog and Digital Computer Techniques

4 Q.H.*

Analog and digital computers for both time- and displacement-based problems. Review of Boolean Algebra and Digital Logic. Applications. Study of software for digital computers. Discussions about hybrid computers.

Prof. Blanchard

Fall and Winter Qtrs.

02.176 Dynamics

(Prereq. 02.166) 2 Q.H.

An intermediate course in engineering mechanics. Topics treated are: central force motion, gyroscopic motion, dynamic stability, variational mechanics, and the principle of least action. The Lagrangian equation of motion is developed and applied to problems of the dynamics of particles and rigid bodies.

Profs. Yorra and Lautman

Spring and Summer Qtrs.

02.192 Measurement and Analysis

4 Q.H.*

Principles of engineering experimentation and instrumentation (including the thorough introduction to the analog computer) stressed in lectures and in proper design of experiments to minimize experimental error and uncertainty. Tests on machines particularly suited to illustrate above and commensurate with students' academic background.

Prof. Phalen

Fall and Winter Qtrs.

02.193 Mechanical Engineering Laboratory

(Prereq. 02.192) 4 Q.H.*

Project-type experiments. Students choose, research, design, and manage experiments which are of particular interest to the group and which illustrate principles of thermodynamics, strength of materials, fluid mechanics, heat transfer, etc.

Prof. Phalen

All Qtrs.

02.194 Mechanical Engineering Senior Project

(Prereq. 02.192) 4 Q.H.

A project may be of an analytical, design, or experimental nature. It must be approved by the faculty member under whom the student will work. A formal report must be submitted to the student's faculty supervisor at the end of the quarter.

Staff

Fall, Winter, and Spring Qtrs.

02.196 Materials Science

5 Q.H.*

Crystallography, structure of solids, imperfections in crystals, phase equilibrium, basic mechanisms of metal strengthening and mechanical behavior, and the effect of temperature on the structure and properties of materials (recrystallization, recovery, precipitation, rate processes).

Profs. Nowak, Murphy, and Zotos

Spring and Summer Qtrs.

02.197 Mechanical Behavior of Materials

(Prereq. 02.196) 4 Q.H.

Elastic properties of materials, atomic basis for elastic constants, dislocation theory, plasticity of crystals and noncrystalline solids. Creep, fracture, fatigue.

Prof. Murphy

Fall and Winter Qtrs.

02.198 Materials Processing

(Prereq. 02.196) 4 Q.H.

Casting, joining, soldering, brazing, welding, mechanical forming, and conventional and nonconventional machining. The topics deal with metals and nonmetals.

Prof. Zotos

Spring and Summer Qtrs.

02.199 Materials Science (*Not open to Mech. Eng. majors*)

4 Q.H.

Covers material in 02.196, but no laboratory work included.

Profs. Nowak, Murphy, and Zotos

Fall and Winter Qtrs.

02.232 Engineering Materials

(Prereq. 02.196 or equiv.) 4 Q.H.

Thermodynamics of materials; phase equilibria ternary systems; reactions with environment, i.e. kinetics, oxidation, corrosion, etc.; materials design criteria and materials engineering case studies.

Prof. Zotos

Spring Qtr. 1974-75

02.233 Thermodynamics of Propulsion

(Prereq. 02.131) 4 Q.H.

Application of the physical principles of thermodynamics, fluid mechanics, and plasmas to the prediction of the behavior of propulsion devices. Air-breathing engines and rocket engines are discussed in detail, with emphasis on realistic applications to demonstrate how physical laws both describe and limit the performance of particular devices. An introduction to plasmas is given. The fundamentals of electrical rocket propulsion are included.

Prof. Zelinski

Fall and Winter Qtrs. 1974-75

02.235 Statistical Thermodynamics

4 Q.H.

Entropy and randomness assemblies of independent particles; Boltzmann, Bose-Einstein,

and Fermi-Dirac statistics; monatomic and polyatomic gases; Einstein and Debye theories of the specific heat of solids; mixed gases; chemical and dissociative equilibrium.

Prof. Nelson

Not offered 1974-75

02.236 Nuclear Engineering I

4 Q.H.*

Study of nuclear physics emphasizing atomic and nuclear structure, radioactive decay, and nuclear reactions, with particular attention to fusion and fission. Health physics, nuclear instrumentation, and the production and uses of radioactive isotopes. A general comparison of thermal, fast, and broader reactor types is made prior to a discussion of neutron interactions and their slowing down. The four-factor formula and diffusion equation are developed and applied to one-group theory for bare and reflected thermal reactors. Energy production and distribution within the core and flux shaping are discussed.

Profs. Bowman and Foster

Fall and Winter Qtrs.

02.237 Nuclear Engineering II

(Prereq. 02.236) 4 Q.H.

Development of two-group theory for thermal reactors and consideration of the physics and safety of fast reactors. Effect of reactivity change, either intentional or accidental, as well as changes due to temperature, fission product buildup, xenon buildup after shutdown, and fuel depletion discussed. Reactor design considerations considering the interrelationship of reactor physics, reactor engineering control, distribution of power, fuel cycle management.

Profs. Bowman and Foster

Spring Qtr.

02.258 Gas Dynamics

(Prereq. 02.130) 4 Q.H.

Derivation of the conservation laws of fluid flow, wave motion and Mach number, adiabatic flow, calculation of propulsion forces, adiabatic flow with friction, normal shock analysis, analysis of compressible flow with heating or cooling, moving and oblique shock waves.

Prof. Nelson

Spring Qtr. 1974-75

02.260 Heat and Mass Transfer

(Prereq. 02.150) 4 Q.H.

Review of heat, mass, and momentum transfer analogies; rate equations. Conduction problems in steady-state and transient-state for both heat and mass transfer with various constant and fluctuating boundary conditions in rectangular, cylindrical, and spherical coordinates solved by formal mathematics, difference (relaxation) techniques, and methods of analogy. Thermal stresses induced by nonuniform temperature distributions; heat transfer at high velocity and in rarefied gases; boiling heat transfer at temperature extremes, with forced and natural convection; phase change in bulk stagnant systems.

Prof. Bowman

Spring Qtr.

Electrical Engineering

03.101 Discrete Systems

(Prereq. 10.153) 4 Q.H.

Historical review and future perspectives of discrete systems; representation of digital signals, quantization; introduction to digital filters, moving average filters; Z-transforms, inverse Z-transforms; recursive digital filters, stability considerations, steady-state and transient response; introduction to non-recursive techniques, the discrete Fourier transform, the fast Fourier transform; applications to computation of system transfer functions.

Profs. Remillard and Proakis

Fall and Winter Qtrs.

03.111 Circuits and Systems I

(Prereq. 10.153) 4 Q.H.

Circuit elements (linear, nonlinear, time-invariant, and time-varying) sources (independent and controlled), Kirchhoff's laws, Tellegen's theorem, Thevenin's theorem, network topology, mesh and nodal analysis.

Prof. Martin

Fall and Winter Qtrs.

03.112 Circuits and Systems II

(Prereq. 03.111) 4 Q.H.

Linearity and time-invariance, system function, forced and force-free response of networks and L.T.I. systems, singularity response, partial fraction expansion, "Pre-box" concept, and

*Including lab

signal flow graphs.

Prof. Kellner

Spring and Summer Qtrs.

03.113 Circuits and Systems III

(Prereq. 03.112) 4 Q.H.

Thevenin's theorem revisited, magnitude and phase plots, resonance, two-port networks, energy and power, and convolution.

Prof. Kellner

Fall and Winter Qtrs.

03.122 Circuits and Systems IV

(Prereq. 03.113) 4 Q.H.

Fourier analysis, Fourier series and transform, spectral analysis of AM-modulation, bilateral Laplace transform, unilateral Laplace transform, and correlation.

Prof. Schetzen

Spring and Summer Qtrs.

03.131 E.E. Laboratory I-Measurements

(Prereq. 03.111) 2 Q.H.*

Basic electrical measurements, report writing, use of standard laboratory instruments including digital voltmeters, oscilloscopes, and bridges.

Prof. Martin

Spring and Summer Qtrs.

03.132 E.E. Laboratory II-Circuits and Systems

(Prereq. 03.112) 2 Q.H.*

Experiments tied in the Circuits and Systems courses, together with more work in measurements.

Prof. Martin

Fall and Winter Qtrs.

03.133 E.E. Laboratory III-Devices

(Prereq. 03.141) 2 Q.H.*

Introduction to the analog computer, electro-optics, terminal characteristics of active devices.

Prof. Martin

Spring and Summer Qtrs.

03.134 E.E. Laboratory IV

(Prereq. 03.142, 03.161) 2 Q.H.*

Analog computation, logic circuits, design and testing of active circuits, microwaves studies, control systems.

Prof. Martin

Fall and Winter Qtrs.

03.141 Electronics I

(Prereq. 03.122) 4 Q.H.

This first course in electronics stresses the significance of nonlinear active devices as related to the behavior of circuits and systems concerned with functions in the frequency domain. Linear models for diodes, and discrete and integrated circuit active devices are developed to cope with the d-c characteristics and incremental gain and impedances of such devices. The concept of ideal amplification is modified to stress the limitations imposed upon bandwidth and gain by impedance levels, noise, parameter variation, and distortion encountered with current active devices. Consideration is given to cascaded stages, composite two-part, hybrid, and nonhybrid configurations.

Prof. Cochran

Fall and Winter Qtrs.

03.142 Electronics II

(Prereq. 03.141) 4 Q.H.

This course is a continuation of Electronics I. Consideration is given to various types of coupling for cascaded stages, with emphasis on the differential configuration as the heart of the generalized operational amplifier. The topic of feedback for single loop amplifiers emphasizes the concept of loop gain and its influence on gain, impedance levels, bandwidth, and stability. Consideration is given to both desirable and undesirable stability concepts. The topic frequency translation included AM, FM, and PM systems. Frequency selective amplifiers are considered on the basis of LC-tuned circuits and active filters.

Prof. Cochran

Spring and Summer Qtrs.

03.144 Electronics III

(Prereq. 03.142) 4 Q.H.

This course is a continuation of Electronics II. Operational amplifiers are introduced, with consideration given to their operation, limitations, and applications. Applications include linear functions in the frequency domain and analog arithmetic operations. The topic, digital circuits, is related to the basic structure of digital computers. Consideration is given to the fundamental operation of active devices, bipolar, J-FET's and MOS-FET's, as switches, logic

gates, function generation, pulse and delay circuits, and memories. These fundamental operations are related to current integrated circuits, including MSI and LSI.

Profs. Cochrun and Rochefort

Fall and Winter Qtrs.

03.161 Electromagnetic Field Theory I

(Prereq. 10.156, 11.207) 4 Q.H.

Definition and representation of scalar and vector fields. Coordinate systems; elements of vector calculus; definition of the concepts of gradient, divergence, curl, and the "del" operator; free-space electrostatics; definition of the electric field intensity; the scalar potential; solution to Poisson and Laplace equations; macroscopic model of dielectric materials; the electric polarization and the electric flux density vector; boundary conditions; Lorentz force; free space magnetostatics; magnetic vector potential and solution to the "vector" Poisson equation; macroscopic model of magnetic materials; magnetization and magnetic field intensity; boundary conditions.

Prof. Schwab

Fall and Winter Qtrs.

03.162 Electromagnetic Field Theory II

(Prereq. 03.161) 4 Q.H.

Generalization of the Maxwell equations to the case of time-varying fields; Faraday induction law; wave equations and the plane wave solution; Poynting theorem and the concept of energy stored by the fields; reflection and refraction of plane waves; time harmonic wave equations for the scalar and vector potentials; time harmonic form of retarded potentials; radiation from a dipole; motion of charged particles in fields; magnetoionic media; elementary discussion of plasma physics and M.H.D.

Prof. Schwab

Spring and Summer Qtrs.

03.174 Basic Power Circuits

(Prereq. 03.112) 2 Q.H.

Balanced and unbalanced polyphase power circuits, harmonics, symmetrical components, and application to the solution of fault conditions in power circuits.

Prof. Feldman

Fall and Winter Qtrs.

03.175 Electromechanical Dynamics

(Prereq. 03.113, 03.162) 4 Q.H.

Review of Maxwell's equations and quasistatic approximations, electric and magnetic energy concepts, state variable formulation of electromechanical coupling. Applications to elementary energy conversion devices, singly and doubly-excited magnetic devices with mechanical translational and rotational elements. Generalized rotating electromagnetic energy converters, circuit-model concepts, applications to selected extant rotating machines: i.e., commutator machines and a-c machines; dynamic response to various stimuli.

Prof. Golden

Fall and Winter Qtrs.

03.176 Machines and Systems

(Prereq. 03.174, 03.175) 4 Q.H.

A detailed investigation of the operating principles of synchronous machines, synchronous motor and generator power-angle characteristics, machine dynamics, machine and power system stability.

Prof. Feldman

Spring Qtr.

03.183 Electrical Engineering I (*Not open to Elect. Eng. majors*) (Prereq. 10.152) 4 Q.H.

Introductory course to electric circuit theory covering Kirchhoff's Laws, loop and nodal analysis, Thevenin's theorem, power and energy, exponential excitation and the system function.

Prof. Grabel

Fall and Winter Qtrs.

03.184 Electrical Engineering II (*Not open to Elect. Eng. majors*) (Prereq. 03.183) 4 Q.H.

Properties and analysis of electronic devices, circuits, and systems; elements of control systems; principles of energy conversion. Emphasis on each topic determined according to major discipline.

Prof. Grabel

Spring and Summer Qtrs.

03.185 Power System and Controls

(Prereq. 03.183) 4 Q.H.

Basic concepts of electromechanical energy conversion stressing the terminal characteristics and operation of d-c and a-c machines, elements of power distribution

systems, and concepts of feedback control, with applications to power systems and plant control.

Prof. Grabel

Spring Qtr.

03.186 Basic Electrical Instrumentation

(Prereq. 03.183) 4 Q.H.*

Basic electrical measurement devices including ammeters, voltmeters, oscilloscopes, and bridges; instrumentation techniques such as direct measurement, comparative measurement, and analog methods. Application to nonelectrical disciplines is included.

Prof. Grabel

Spring Qtr.

03.187 Modelling Techniques

(Prereq. 03.183 and 03.184; also Fortran IV programming.) 4 Q.H.

Introduction to the concept of modelling techniques to represent physical, biological, and social systems; electrical analogs and use of analog computers; introduction to digital modelling and the use of digital computation.

Prof. Grabel

Fall and Winter Qtrs.

03.191 Introduction to Digital Computers I: Design and Organization

(Prereq. 03.141) 4 Q.H.

Introduction to the basic components of the general organization of a stored-program digital computer; number systems and base conversions, machine presentation of binary numbers and characters, coding and flow charting; non-machine arithmetic in different bases, machine arithmetic in binary; storage of data sets and data flow within a computing system; hybrid computation; decision tables, definition and properties of Boolean algebra, logic expression minimizations, analysis and synthesis in combinatorial logic; computer elements, micro-operation, sequences; organization of a commercially available stored-program computer; a large-scale batch-processing system.

Profs. Stuart and Verma

All Qtrs.

03.192 Introduction to Digital Computers II: Fundamentals of Computation Structures

(Prereq. 03.191) 4 Q.H.

Formal forms of Boolean expressions; NAND/NOR and other two-level implementations (integrated circuit viewpoint); arithmetic and logic of speed-up techniques; analysis and synthesis of sequential switching logic circuits, pulse-mode and level-mode sequential logic; memory structures, trends in memory system organization and speed capacity trade-offs, addressing techniques and storage allocations; "atoms," "molecules," logic design and physical realization of the functional building blocks of automatic digital machines.

Profs. Verma and Kaliski

Spring and Summer Qtrs.

03.218 Control System Theory

(Prereq. 03.142) 4 Q.H.

Control system concepts; goals and basic components. Review of time and frequency domain techniques. Classical control system theory; error analysis for different type systems. Analyses of second- and third-order systems. Stability and relative stability using root locus and Nyquist diagrams. The Nichols chart. Compensation, application of computer technology to control systems analysis and design. State variable description of dynamic systems. The state equations and the fundamental analog realization of the standard equations. Solution of the state equations. Properties of the state transition matrix. Optimal systems. Introduction to sampled data systems. The Z-transform as an analog to the Laplace transform.

Prof. Loewenthal

Fall and Winter Qtrs.

03.221 Electric Power Systems I

(Prereq. 03.174) 4 Q.H.

This course, along with that following it, is designed to give a broad view of the structure of those electric systems whose primary function is energy transfer, and especially those whose function is the transfer of large quantities of energy. The functions of the various system elements are described and their significant characteristics are investigated briefly. The interrelation between elements is treated.

Prof. Cogbill

Fall and Winter Qtrs.

03.222 Electric Power Systems II

(Prereq. 03.221) 4 Q.H.

A continuation of Electric Power Systems I. Problems such as voltage control, protection, economics, and planning which relate to the system as a whole. Taken with the previous course, it provides a general background for more intensive studies of electric power systems.

NOTE: A student may take both electives in sequence or may take the first course only.

Prof. Cogbill

Spring Qtr.

03.233 E.E. Power Laboratory I

(Prereq. 03.174) 2 Q.H.*

Experimental work with polyphase power equipment, power measurements, polyphase power rectification, steady-state and dynamic operation modes of polyphase induction motors, power transformers and symmetrical component analysis of unbalanced loading of transformers, analog computer.

Prof. Cleveland

Fall and Winter Qtrs.

03.234 E.E. Power Laboratory II

(Prereq. 03.172, 03.233) 2 Q.H.*

Experimental work with rotating machinery and systems; steady-state and dynamic modes of operation of the commutator and synchronous machines; system study involving synchronous machines; selected experiments in control systems; network analyzer studies.

Prof. Cleveland

Spring Qtr.

03.237 Senior Project Laboratory I

(Prereq. 03.142, 03.162) 2 Q.H.*

In this course students work with a faculty adviser on some term project, either experimental or theoretical.

Prof. Dolansky

03.238 Senior Project Laboratory II

(Prereq. 03.142, 03.162) 2 Q.H.*

This course may be a continuation of the project started in 03.237 or it may be a new project. Again, the student works closely with a faculty adviser.

Prof. Dolansky

03.241 Selected Topics in Electronics

(Prereq. 03.144) 4 Q.H.

A systems approach to the design of both digital and analog data-processing circuits. Circuits discussed include: shift-registers, adders, analog-to-digital and digital-to-analog converters, analog logic, function generators, and analog arithmetic units. Also included are the topics of noise in electronic circuits, and gain, frequency, and phase control.

Prof. Lob

Spring Qtr.

03.242 Theory and Technology of Semiconductor Devices I

(Prereq. 02.196) 4 Q.H.*

This course comprises a closely coupled lecture and laboratory series. Topics covered include: technology and physics of the planar diffusion process, electronic properties of homogeneous semiconductors, inhomogeneities and junctions (Fermi potential diagrams, equilibrium at an abrupt discontinuity, and the behavior of a junction under applied bias), the junction transistor.

Prof. Feldman

Fall and Winter Qtrs.

03.243 Theory and Technology of Semiconductor Devices II

(Prereq. 03.242) 4 Q.H.*

This course is a continuation of 03.242. Material covered includes: introduction to unipolar transistor action, introduction to surface effects, the MOS-FET, and a discussion of noise problems encountered in semiconductor devices.

Prof. Feldman

Spring Qtr.

03.251 Communication Theory

(Prereq. 03.122) 4 Q.H.

Introduction to classical modulation theory, probability theory, and some recent developments in communication theory. Topics include: signal space concepts, AM and FM, pulse modulation, matched filter, autocorrelation function, sampling theorem, probabilistic description of signals, source entropy, and channel capacity.

Prof. Gonsalves

Spring Qtrs.

*Including lab.

03.261 Wave Transmission and Reception

(Prereq. 09.106, 09.107) 4 Q.H.

Analysis of radiation, transmission, and reception of electromagnetic and acoustic waves using graphical and digital computer techniques. Design of distributed systems, antennas, microphones, loudspeakers, and sonar transducers.

Prof. Remillard

Spring and Summer Qtrs.

03.262 Advanced Topics in Electromagnetic Field Theory

(Prereq. 03.162) 4 Q.H.

This course is a continuation of the required courses in field theory. Topics covered include (but are not limited to): microwave and waveguide structures, careful development of electromagnetic energy and force concepts, and an introduction to radiation and antenna theory.

Prof. Schwab

Spring Qtr.

03.281 Machine Language and Assembly Language Programming

(Prereq. 03.191) 4 Q.H.

Study of the machine language and assembly language of a selected digital computer. Machine representation of numbers, characters, and instructions. Machine language programming; flow of control, relocatability, input/output instructions, addressing, and instruction modification. Symbolic assembly language; macros, literals, and pseudo-instructions. Several programming projects will be an integral part of the course.

Prof. Kaliski

Fall and Winter Qtrs.

03.282 Programming Systems

(Prereq. 03.281) 4 Q.H.

Continuation of 03.281. Assemblers; searching and sorting techniques; macro-processors; loaders. High-level languages and an introduction to their compilation. Programming projects will be an integral part of the course.

Prof. Kaliski

Spring Qtr.

03.285 Applied Discrete Analysis

(Prereq. 10.156) 4 Q.H.

Introduction to elementary number theory, modern algebra, combinatorial mathematics and discrete probability theory, including such topics as prime numbers, least common multiple and greatest common divisor, Euclid's algorithm, continued fractions, congruences, groups, rings, fields, Boolean algebra, combinations and permutations, generating functions, random variables and Markov chains. The material in this course is widely applicable to the field of computer science.

Prof. Kaliski

Spring Qtr.

03.292 Mathematical Techniques in Electrical Engineering I

(Prereq. 10.156 or equiv.) 4 Q.H.

Definition and representation of a complex variable and of functions of a complex variable. Topics covered are: conformal mapping, singularities, Laurent series, residues, and contour integration. Applications of complex variable theory to Fourier theory, Hilbert transforms, conformal transformations in the analysis of linear systems and in electrostatics.

Prof. Carrabes

Fall, Winter, and Spring Qtrs.

03.293 Mathematical Techniques in Electrical Engineering II

(Prereq. 10.156 or equiv.) 4 Q.H.

Matrix notation and development of matrix algebra. The solubility of sets of linear equations; determinants, linear transformations, invariance, quadratic forms and eigenvalues. Illustrative applications of matrix techniques for the formulation and solution of problems drawn from the realm of circuit theory, probability theory, and engineering physics.

Prof. Carrabes

Fall, Winter, and Spring Qtrs.

03.295 Numerical Methods and Computer Applications (Prereq. 09.106, 03.122) 4 Q.H.

Presentation of numerical techniques used in solving scientific and engineering problems with the aid of digital computers. Topics covered include: modeling and simulation of deterministic and probabilistic systems, theory of interpolation, iteration methods, numerical solution of ordinary and partial differential equations, signal detection, and use of libraries of

scientific subroutines. Representative problems are chosen for solution on a digital computer.

Prof. Remillard

Fall and Winter Qtrs.

03.296 Digital Techniques

(Prereq. 03.142, 03.191) 4 Q.H.

The characterization of devices, circuits and integrated structures encountered in digital systems, digital data transmission, error rates and systems parameters, synchronous-asynchronous information processing techniques related to bulk and surface storage media. Digital system reliability, failure rates, redundancy techniques. Computer-aided design, testing of digital systems, timing considerations in digital systems.

Prof. McCarthy

Spring Qtr.

Chemical Engineering

04.101 Chemical Engineering Calculations I

(Prereq. 12.115) 4 Q.H.*

Application of the fundamental laws of mass and energy conservation and equilibrium concepts to chemical and physical processes; economic considerations leading to optimal solutions. A computational laboratory is included to improve the facility of the student in handling sophisticated problems. Analog and numerical approaches are stressed where applicable.

Prof. Buonopane

Winter Qtr.

04.102 Chemical Engineering Calculations II

(Prereq. 04.101) 4 Q.H.

Simultaneous application of energy and mass conservation laws coupled with equilibrium considerations to comprehensive problems selected from the chemical processing industries; both steady and unsteady state processes.

Prof. Buonopane

Summer Qtr.

04.106 Polymer Science and Engineering

(Prereq. 12.147) 4 Q.H.

Acquaints the students with the nature of polymeric materials and their importance to the chemical industries and to everyday life. Topics include polymer classification, composition, and structure; polymer synthesis, including the chemistry of step-reaction and chain polymerization and addition copolymerization; polymer rheology; commercial production.

Prof. Goodwin

Summer Qtr.

04.111 Chemical Engineering I

(Prereq. 04.102) 4 Q.H.

The important unit operations of chemical engineering. Fluid mechanics, heat transfer, and evaporation.

Prof. Stewart

Fall Qtr.

04.112 Chemical Engineering II

(Prereq. 04.111) 4 Q.H.

A continuation of 04.111. Drying, distillation, absorption, and extraction.

Prof. Stewart

Spring Qtr.

04.121 Transport Phenomena I

(Prereq. 04.112) 4 Q.H.

Momentum transport in the flow of fluids. The mechanisms of momentum transport by molecular motion and eddy motion are described. Momentum transport in systems of engineering interest are analyzed in terms of these mechanisms.

Prof. Williams

Fall and Winter Qtrs.

04.122 Transport Phenomena II

(Prereq. 04.121) 4 Q.H.

Heat and mass transport in systems of engineering interest. The mechanisms of transport by molecular motion and convective motion are described and applied to a variety of elementary problems.

Prof. Williams

Spring and Summer Qtrs.

04.123 Experimental Methods I

(Prereq. 04.112) 4 Q.H.*

Experimental engineering methods; basic measurements, design of experimental apparatus,

*Including lab.

laboratory report writing, design of experiments, and data accuracy are stressed. Suitable experiments are performed.

Prof. Troupe

Fall and Winter Qtrs.

04.124 Experimental Methods II

(Prereq. 04.123) 4 Q.H.*

A continuation of 04.123 with emphasis on the development of an experimental program, reduction of data, and presentation of results; use of computers in simulating experimental conditions and for constructing mathematical models.

Prof. Troupe

Spring and Summer Qtrs.

04.126 Chemical Engineering Thermodynamics

(Prereq. 04.102, 12.167) 4 Q.H.

The first law and its application to batch and flow systems, heat effects in chemical and physical processes, thermodynamic properties, the second law, entropy, physical and chemical equilibria; emphasis on the fundamental principles and mathematical relationships and their application to the analysis and solution of a variety of engineering problems.

Prof. Goodwin

Fall and Winter Qtrs.

04.131 Process Design

(Prereq. 04.122, 04.126) 6 Q.H.*

The class participates in the process design of a chemical plant capable of producing a specified annual tonnage of a chemical when specific raw materials are available. The fundamentals of chemical engineering science, practice, analysis, and economics which have been studied in previous courses are used to prepare a report containing flow sheets, material and energy balances, designs of processing units, and cost estimates of the capital requirements for procuring, erecting, and operating the plant.

Mr. Regan

Fall and Winter Qtrs.

04.132 Process Design

(Prereq. 04.131) 6 Q.H.*

Each student or a small group of students designs a chemical plant to produce a specified annual tonnage of one or more chemicals with a specific feed stock. The techniques used in Process Design I are used by each student to prepare an individual process design report and cost estimate for the particular plant assigned.

Mr. Regan

Spring Qtr.

04.133 Projects

(Prereq. Senior student and consent of Dept.) 6 Q.H.*

Individual research related to some phase of chemical engineering. Open only to students selected by the department head on the basis of scholarship and proved ability.

Prof. Troupe and Staff

Fall and Winter Qtrs.

04.134 Projects

(Prereq. 04.133) 6 Q.H.*

A continuation of the research work undertaken in 04.133.

Prof. Troupe and Staff

Spring Qtr.

04.135 Principles of Nuclear Engineering

(Prereq. 10.156, 11.206) 4 Q.H.

Nuclear physics, nuclear fission, the nuclear chain reaction, reactor theory, radiation shielding, materials of construction, reactor instrumentation and control, separation of stable isotopes, chemical separation, processing and special techniques of nuclear engineering.

Prof. Buonopane

04.136 Chemical Engineering Kinetics

(Prereq. 12.167, 04.126) 4 Q.H.

Fundamental theories of a rate of chemical change including collision and transition state theory in homogeneous reacting systems; integral and differential analysis of kinetic data and a design of batch and continuous flow chemical reactors; catalysis theory and design of catalytic reactors.

Prof. Goodwin

Spring and Summer Qtrs.

04.137 Mathematical Methods in Chemical Engineering

(Prereq. 10.156) 4 Q.H.

Formulation and solution of problems involving advanced mathematical methods. The problems are taken from chemical and engineering studies of equilibrium and rate processes. Emphasis is placed primarily on the formulation step. However, numeric and analytic solution

*Including lab.

techniques for solving sets of algebraic equations and for solving ordinary and partial differential equations are discussed.

Prof. Goodwin

Spring Qtr.

04.138 Process Control Systems

(Prereq. 10.155 or permission) 4 Q.H.

Introduction to the principles of automatic control systems. Emphasis on modeling, stability, and design of linear feedback systems for control of temperature, liquid level, and composition.

Prof. Stewart

All Qtrs.

04.141 Junior Honors Program

(Prereq. Approval of Dept.) To be assigned.

Those students undertaking a Junior Honors Program may petition for two credits for the research problem undertaken.

Prof. Troupe

All Qtrs.

04.142 Introduction to Optimization

(Prereq. 10.155) 4 Q.H.

Elementary optimization techniques are applied to problems encountered in the chemical processing industry. These techniques include gradient search, pattern search, linear and dynamic programming. A knowledge of differential calculus is required.

Prof. Williams

Spring Qtr.

04.143 Special Topics

(Prereq. Senior standing) 4 Q.H.

Chemical engineering topics of interest to the staff member conducting the class are presented for study.

Prof. Troupe and Staff

Spring Qtr.

04.145 Mass Transfer Operations

(Prereq. 04.122) 4 Q.H.

Calculation and design methods used in processes involving mass transfer. Topics covered include vapor liquid equilibria for binary and multicomponent systems, multicomponent distillation, absorption and extraction. Emphasis is placed on methods and techniques involving digital computer computations.

Prof. Williams

04.146 Introduction to Nuclear Power Engineering (E.E.) (Prereq. 10.156, 11.207) 4 Q.H.

Course for Electrical Engineering Power Systems students. Introduction to nuclear engineering, fundamental concepts of nuclear power, nuclear reactors and power plants, radiation protection and safety. Supplementary laboratory experiments.

Prof. Buonopane

Spring Qtr.

04.147 Analysis of Chemical Processes

(Prereq. 04.126, 04.136) 4 Q.H.

Methods and reactions used for making chemical products on a large scale. Topics covered include types of physical and chemical equilibria, flow sheet patterns, energy management, and catalytic and noncatalytic rate problems. A number of situations involving simultaneous application of the above topics in process analysis are studied.

Prof. Goodwin

04.148 Management in the Chemical Industries

(Prereq. Senior standing in engineering) 4 Q.H.

Principles of management as applied to the chemical process industries. Case studies are used wherever possible, and outside experts are scheduled to lead some of the seminar sessions.

Prof. Troupe

04.149 Kinetics of Polymerization Processes

(Prereq. 04.136, 12.148) 4 Q.H.

The mechanisms by which polymeric materials are assembled via chemical reaction. Reaction rate models based on these mechanisms are utilized to investigate the effect of reaction parameters on the chemical and physical structure of the polymeric product. The types of polymerization processes considered are free radical addition, condensation, and ionic polymerization.

Prof. Williams

Industrial Engineering

05.128 Work Design

4 Q.H.*

Philosophy and principles of work design; use of graphic models such as process charts, operation charts, man-machine charts, etc. Work measurement techniques including stop watch, synthetic standard, and work sampling. Extensive use of projects.

Prof. Hoover

Fall and Winter Qtrs.

05.129 Manufacturing Processes

4 Q.H.*

Principles and techniques in processes for the manufacture of articles of commerce, with emphasis on process design and cost, and consideration of process control and automation; metal working, forming, machining, and bonding; job-shop tooling and techniques; plastics and rubber forming and extruding; textiles, paper, electronics, food processing, and other manufacturing operations. Principles and procedures to obtain optimum value in products, methods of revealing excessive costs; relationship of value analysis to design, manufacturing procurement, and installation.

Prof. Hulbert or Fischer

Spring and Summer Qtrs.

05.130 Systems I

(Prereq. 10.154) 4 Q.H.

Linear feedback systems and solutions for steady state in first-order systems. Integral and derivative control. LaPlace transforms for continuous systems analysis and Z-transforms in discrete systems. Transfer functions.

Prof. Satia

Spring and Summer Qtrs.

05.131 Systems II

4 Q.H.

Continuation of Systems I with emphasis on applications; inventory, distribution, and information systems; introduction to simulation of large systems with digital computers.

Prof. Satia

Fall and Winter Qtrs.

05.145 Probabilistic Analysis for Engineers

(Prereq. Integral & Differential Calculus) 4 Q.H.

Development of probability theory which underlies such engineering problems as inventory, queuing, and quality control. Probability theory presented axiomatically, with emphasis on sample space representation of continuous and discrete random variables. Material will cover standard distributions: i.e., normal, gamma, exponential, poisson, binomial, and others. Topics include expectation, transform techniques, change of variable.

Prof. Buoncristiani

Spring and Summer Qtrs.

05.147 Statistics I

(Prereq. 10.208) 4 Q.H.

Definition of a statistic; distributions of random variables including normal, t, chi-square, F, poisson, binomial; estimation of parameters-point estimation by method of moments, maximum likelihood, Bayes estimates.

Prof. Hoover

Fall and Winter Qtrs.

05.148 Statistics II

(Prereq. 05.147) 4 Q.H.

Interval estimation, stating and testing hypothesis, linear regression, analysis of variance, applied topics such as reliability, quality control, decision theory from Bayes Rule.

Prof. Buoncristiani

Spring and Summer Qtrs.

05.149 Reliability and Quality Control

(Prereq. 05.147) 4 Q.H.*

Applied probability and statistical inference techniques are utilized in reliability analysis and quality control. Both theory and application are discussed in relation to the total quality assurance program.

Staff

Fall and Winter Qtrs.

05.150 Industrial Cost Control

4 Q.H.

Fundamental concepts of accounting, with emphasis on use of financial records for making engineering decisions. Study of financial statements of a firm. Contrast in usefulness of data from absorption costing vs. direct costing. Interpretation of variance accounts.

Prof. Marcotte

Fall and Winter Qtrs.

*Including lab.

05.151 World Dynamics

4 Q.H.

Feedback analysis of industrial dynamics is used to set forth a dynamic computer model of world scope to include the interactions among population, capital investment, geographical space, natural resources, pollution, and food production. The interactions of these major sectors are studied by means of the computer, and various technological and political policies are tested and evaluated over spans of up to 250 years. The quality of life is suggested as a crucial factor in world equilibrium. *Computer programming experience not necessary.*

Prof. Geyer

Fall and Winter Qtrs.

05.161 Operations Research I

4 Q.H.

Deterministic models including L.P. and duality, transportation and allocation, sensitivity and post-optimality analysis. Network analysis including maximal flow, shortest route, and PERT; dynamic programming and recursive functional expressions; game theory.

Prof. Freeman or Satia

Spring and Summer Qtrs.

05.163 Operations Research II

(Prereq. 10.208) 4 Q.H.

Stochastic models in O.R.; their analytical development and solution. Topics covered: queuing models, deterministic and stochastic inventory models, Markov chains, sequencing.

Prof. Freeman or Satia

Fall and Winter Qtrs.

05.165 Production and Inventory Control

(Prereq. 10.208 or equiv.) 4 Q.H.

Basic inventory models and inventory management systems. Single-stage and multi-stage systems and their dynamics. Production control and aggregate planning. Mathematical and heuristic approaches to aggregate scheduling. Cost structure and decision framework oriented analysis. Consideration of job-shop scheduling and dispatching problems.

Prof. Freeman

Spring and Summer Qtrs. 1975 and odd years.

05.166 Facilities Design

4 Q.H.*

Application of quantitative techniques such as queuing theory and engineering economy to problems involving facilities planning and materials handling. Basic graphical tools, models for plant layout, and laboratory projects.

Spring and Summer Qtrs.

05.186 People in Organizations

(Prereq. Seniors only) 4 Q.H.

The individual in the work environment. Work theory, motivation, and interpersonal relations based on the concepts of the behavioral sciences; structure and dynamics of organizations; problems of innovation; case studies for situational analysis to develop skill in applying behavioral concepts.

Profs. Fisher and Geyer

Fall and Winter Qtrs.

05.187 Industrial Relations

4 Q.H.

Analysis of industrial relations and organized labor, with emphasis on the historical developments leading to their current status. Union organization and philosophy, interaction of management, government and labor, collective bargaining, the labor contract, the personnel function, and the engineer's role in industrial relations.

Prof. Fisher

Spring Qtr.

05.190 Senior Project

1 Q.H.

A significant industrial engineering project executed independently by the student, culminating in a well-organized and well-written report to be submitted to his class adviser and reviewed by a faculty committee. No regularly scheduled classes. Pass/fail basis.

Class Advisers

Fall and Winter Qtrs.

05.201 Principles of Computation and Programming I

4 Q.H.

Review of algorithms, computers, and programming at the FORTRAN level. Machine language programming (instruction, execution and addressing techniques). Coding and representation of data and structure. Subroutines, input-output, and simultaneous operations. Assemblers and loaders. Introduction to list structures and data organization. Program debugging and verification. Survey of machines, devices, and languages.

Prof. Marcotte

Fall Qtr.

05.202 Principles of Computation and Programming II

(Prereq. 05.201 or consent of instructor) 4 Q.H.

Computer and programming system organization. Continuation of machine language programming from 05.201. Operating systems and supervisors. Processing of lists, strings, arrays, stacks, trees, and graphs. Survey of storage and computation equipment. Concepts of time sharing and real time. Properties and characteristics of algorithmic, list, and string processing languages to engineering problems.

Prof. Green

Spring and Summer Qtrs.

05.240 Digital Simulation Techniques

(Prereq. FORTRAN) 4 Q.H.

Design and construction of digital, discrete simulation models. Extensive use of FORTRAN and special simulation languages. Discussion of model logic and specification, testing, validation, and use. Several simulation projects using the Northeastern computer facilities.

Prof. Hoover or Geyer

Spring and Summer Qtrs.

05.241 Management Information Systems

(Prereq. 05.201) 4 Q.H.

Managerial applications of digital computers. The use of computers in information, decision-control systems. Information-based theories of management. Survey of information technology. Computer system basics. Cost and value of information. System design, analysis, equipment selection. Organizational implications.

Prof. Marcotte

Fall, Winter, and Spring Qtrs.

05.245 Basic Engineering Statistics (*Not open to Industrial Eng. majors*)

4 Q.H.

Introduction to basic probability distributions, including the binomial and hypergeometric, exponential, poisson, and normal; laboratory data analysis; statistical test of hypotheses about central tendency and variability; curve fitting with least squares on engineering data.

Prof. Buoncristiani

Fall and Winter Qtrs.

05.260 Engineering Economy

4 Q.H.

The formulation of analytical techniques: i.e., rate of return, present worth, and annual cost. The application of these techniques to reach economical solutions to business and engineering problems involving design, selection, replacement, lease-buy-decisions, and decisions between multiple alternatives. Sensitivity analysis and basic probability are introduced in cases where uncertainty exists. Brief survey of sources and costs of capital, debt-versus-equity-financing, and leverage.

Prof. Satia

All Qtrs.

05.261 Engineering Economy and Statistical Decision Theory

(Prereq. 05.145 or 10.208) 4 Q.H.

The objective of the course is to familiarize the students with the theory and techniques of economic evaluation of investment project. Introductory steps in the analysis of investment proposals, time value of money, and cash flows; analysis of deterministic and stochastic cash flows in terms of present worth, annual cost, rate of return, and benefit/cost ratio. Decision tree for sequential decisions, criteria for decision making under uncertainty, utility theory, value of information, effect of accounting procedures and taxes on investment analysis. Case studies involving replacement, lease, engineering design, and public projects.

Staff

Fall and Winter Qtrs. 1975

05.267 Special Topics in Engineering (Prereq. Seniors or consent of instructor) 4 Q.H.

A senior level course based on the N.U. Management Game which integrates material from prior courses in Business or Engineering. Students learn to manage a simulated firm by making marketing, production and finance decisions with the aid of interactive Decision Support Programs. In addition to game play, lectures cover topics which include business policy, planning and control, inventory policy, capital budget and techniques for model building.

Spring Qtr.

05.290 Independent Study in Industrial Engineering

1—4 Q.H.

For students usually in the senior year with high scholastic standing on advanced I.E. topics.

Projects may be of an applied or theoretical nature; formal report submitted to student's project supervisor at the end of quarter.

Adviser

All Qtrs.

Engineering Technology

MECHANICAL ENGINEERING TECHNOLOGY

02.411 Mechanics A (Prereq. 10.320, 11.317) 4 Q.H.

Forces, moments, couples, statics of particles and rigid bodies in two and three dimensions. Distributed forces: external and internal. First moments and centroids. Analysis of structures: trusses, frames and machines.

02.412 Mechanics B (Prereq. 02.411) 4 Q.H.

Friction, second moments and virtual work. Kinematics of particles: rectilinear and curvilinear motion of dynamic particles. Force, mass and acceleration, work, and energy.

02.413 Mechanics C (Prereq. 02.412) 4 Q.H.

Impulse and momentum of particles. Kinematics and dynamics of rigid bodies: force, mass, and acceleration. Dynamics of rigid bodies: work and energy, impulse and momentum. Introduction to mechanical vibration.

02.414 Stress Analysis A (Prereq. 02.411) 4 Q.H.

Stress and deformation, mechanical properties of materials, allowable stresses and factors of safety, axially loaded indeterminate members, effects of temperature on stresses and strains, thin cylinders and spheres. Riveted and welded joints. Shear and bending moment in beams, stresses in beams, design of beams, curvature of beams.

02.415 Stress Analysis B (Prereq. 02.414) 4 Q.H.

Determinate and indeterminate beam deflections and reactions by numerical and graphical integration and area moment methods; theorem of three moments. Torsional stresses and strains; power transmission; eccentric loads on struts, beams, riveted and welded joints; combined and principal stresses; Mohr's circle; theories of failure.

02.416 Stress Analysis C (Prereq. 02.415) 4 Q.H.

Curved beams, non-symmetrical bending of beams, short-center and shear stresses on thin sections, composite beams. Columns, energy absorption and resilience, inertial stresses, impact loading, deflection of beams by energy methods. Bolted fastenings.

02.417 Mechanical Design A (Prereq. 02.415) 4 Q.H.

Failure criteria, properties and selection of materials, manufacturing considerations, stress concentrations, strength under combined stresses, theories of failure, impact and fluctuating and repeated loads. Stresses, deformation and design of springs; screws, keys, pins and interference fits; preloading of bolted joints; shafts and flywheels; friction brakes.

02.418 Mechanical Design B (Prereq. 02.417) 2 Q.H.

Lubrication and journal bearings; antifriction bearings; stresses and power transmission of spur, bevel, and worm gear; screws for power transmission.

02.421 Thermodynamics A (Prereq. 11.318) 4 Q.H.

General theory of heat and matter, laws of thermodynamics, energy-transformation principles and availability of energy, properties and processes for pure substances and ideal gases. Thermodynamic properties and processes of liquids and vapors, tables and charts, mixtures of fluids, vapor cycles.

02.422 Thermodynamics B (Prereq. 02.421) 4 Q.H.

Theory of vapor engines and analysis of types of actual engines using compression of gases and vapors; internal combustion engines. Theory of gas and vapor flow through orifices and nozzles. Principles of gas compression, analysis of vapor compression, refrigeration systems, low-temperature refrigeration cycles and absorption refrigeration systems.

02.423 Thermodynamics C

(Prereq. 02.422) 4 Q.H.

Air-conditioning principles including psychometrics and heat pumps. Calculation of heating and cooling loads in accordance with A.S.H.R.A.E. practices. Design and performance of steam and gas turbines; spark-ignition and compression-ignition engine design and performance. Fan performance.

02.424 Thermodynamics D

(Prereq. 02.422) 2 Q.H.

The primary modes of heat transfer; thermal conductance/resistance concept; thermal-electrical analog; combined heat transfer mechanisms; basic equations of conduction; thermal conductivity. Analytical solutions of various steady state conduction problems.

02.425 Thermodynamics E

(Prereq. 02.424) 4 Q.H.

Dimensional analysis and similarity considerations, natural and forced convection, hydrodynamic and thermal boundary layers, log-mean temperature differences, overall heat transfer coefficients, applications to heat exchangers. Black body radiation; Kirchoff's Law; emissivity and absorbance; radiation between simple bodies. Graphical and numerical methods applied to steady state, conduction problems; radiation and convection effects; transient heat transfer; numerical methods applied to transient problems; heat transfer engineering problems.

02.431 Materials A

4 Q.H.

Lectures on fundamental metallic structures; general metallurgical information covering theoretical aspects of properties, testing, and failure of metals. Supplemented by visual aids. Lectures on alloying and hardening of metals, refinement of metals, equilibrium diagrams, characteristics of engineering metals, principles of metal fabrication.

02.432 Materials B

(Prereq. 02.431) 4 Q.H.

Inorganic materials, i.e., polymers, glasses, ceramics, cements, wood; and materials having important electrical and magnetic properties. Also a summary of the most recent applications for the fabrication and uses of both metals and nonmetals. Structures of metals, imperfections, phase diagrams, effect of temperature on structure and properties of metals (annealing, recrystallization, recovery, precipitation, diffusion), strengthening mechanisms, mechanical properties of nonferrous metals. Laboratory: experiments in preparation of samples, selection, polishing, and etching; examination of nonferrous metals, use of the microscope, linear analysis, construction of cooling curves, and simple binary phase diagrams.

02.433 Applied Metallurgy

(Prereq. 02.432) 4 Q.H.

Lectures: mechanical properties of ferrous metals, the iron carbon diagram, high-temperature alloys, hardening methods, impact tests, effects of environment on metals. Manufacturing processes, methods of fabrication, limitations on the use of different materials and processes, casting, welding, cutting, drawing, powder metallurgy. Laboratory: experiments on analysis of stress-strain diagrams of iron and steel, heat treatment of steels, surface corrosion, tempering and drawing, use of metallograph and analysis of the results. Experiments in cold rolling, swagging, drawing of nonferrous metals and the analysis of the results. Tension, shear, fatigue, and machinability tests on ferrous metals.

02.441 Fluid Mechanics A

(Prereq. 02.412) 4 Q.H.

Hydrostatics, principles governing fluids at rest, pressure measurement, hydrostatic forces on submerged areas and objects, simple dams, fluids in moving vessels, hoop tension. Fluid flow in pipes under pressure, fluid energy, power and friction loss, Bernoulli's Theorem, flow measurement.

02.442 Fluid Mechanics B

(Prereq. 02.441) 2 Q.H.

Pipe networks and reservoir systems; flow in open channels; uniform flow; energy, friction loss, minor losses, velocity distribution, alternate stages of flow, critical flow; nonuniform flow; accelerated and retarded flow; hydraulic jump and waves.

02.451 Mechanical Vibrations

(Prereq. 02.413) 4 Q.H.

Elements of vibrating systems; one degree of freedom (undamped free and forced vibration from Newton's law of motion and energy methods). Natural frequencies. Damped free and

forced vibration. Impedance and mobility. Systems with more than one degree of freedom. Influence coefficients, Lagrange's equations, generalized coordinates, vibration absorber.

02.452 Experimental Stress Analysis (Prereq. 02.415) 4 Q.H.

Theory and experimentation showing the application of extensometers and electrical strain gages as transducers in the field of experimental stress and strain analysis. Theory and laboratory practice; photoelastic methods as applied to classical model analysis and modern coating analysis.

02.461 Machine Shop 4 Q.H.

Introduction to study of machines for metal processing, cutting tools, and fluids. Machinability; automatic machinery.

02.462 Mechanical Technology Laboratory I

(Prereq. 02.431, 02.415, or concurrently) 2 Q.H.*

Experiments concerning the physical properties of materials. Instrumentation and measurement.

02.463 Mechanical Technology Laboratory II (Prereq. 02.462, 02.441) 2 Q.H.*

Experiments concerning compressible and incompressible fluids. Experimental techniques.

02.464 Mechanical Technology Laboratory III (Prereq. 02.463) 2 Q.H.*

Experiments of a more advanced nature. Introduction to the analog computer and experimental stress analysis.

02.465 Heat Technology Laboratory I (Prereq. 02.442 or concurrently) 2 Q.H.*

Experiments illustrating principles of thermodynamics and heat transfer. Instrumentation and measurement.

02.466 Heat Technology Laboratory II (Prereq. 02.465, 02.424, or concurrently) 2 Q.H.*

Experiments on various types of heat engines. Experimental techniques.

02.467 Project Laboratory (Prereq. 02.464, 02.466) 4 Q.H.*

A project of analytical, design, or experimental nature. Must be approved by student's faculty advisor. A formal report must be submitted.

ELECTRICAL ENGINEERING TECHNOLOGY

03.311 Electronics I (Prereq. 03.303, 11.323 or 11.320) 4 Q.H.

Semiconductor diodes; power supplies and filters. Transistors as amplifying devices. Graphical analysis of basic amplifiers; d-c and a-c load lines. Transistor biasing techniques.

03.312 Electronics II (Prereq. 03.311) 4 Q.H.

Small-signal low-frequency transistor models. A-c equivalent circuits; low frequency amplifier circuits. Frequency effects in audio amplifiers. High-frequency transistor model. Voltage regulation.

03.313 Electronics III (Prereq. 03.312) 4 Q.H.

Continuation of transistor circuits. Untuned amplifiers, feedback amplifiers and oscillators, low-frequency large signal amplifiers. Field effect transistor circuits.

03.323 Electronic Laboratory (Prereq. 03.312) 2 Q.H.*

Experiments dealing with laboratory equipment techniques, transistor and crystal-diode characteristics, the impedance bridge, the Q-Meter, coils with iron cores, filter circuits, vacuum and semi-conductor diodes, power supplies including the regulated type, triode and pentode vacuum tubes, silicon-controlled rectifiers, resistance-coupled amplifiers. Transistor usage.

03.324 Circuits Laboratory I (Prereq. 03.306) 2 Q.H.*

Experimentation in electronic circuit theory utilizing various measurement techniques. Instrumentation verification of circuit theorems; response of circuits to steps and impulses; oscilloscope theory and applications.

03.325 Circuits Laboratory II

(Prereq. 03.324) 2 Q.H.*

Further experimentation in electrical circuits and measurement techniques. Experiments include nonlinear devices, terminal characteristics of active devices, log modulus plots, network parameters and synthesis. Fourier analysis and synthesis.

03.327 Advanced Electronic Laboratory I

(Prereq. 03.323, 03.313) 2 Q.H.*

Experiments dealing with class B audio amplifier with transistors, push-pull amplifiers, drivers, and distortion measurements. Double-tuned transformers, video amplifiers, audio-frequency oscillators, and square-wave testing of audio amplifiers.

03.328 Advanced Electronic Laboratory II

(Prereq. 03.327) 2 Q.H.*

Experiments dealing with operational amplifiers. Modulation of a class C amplifier, the diode detector, basic timing circuits, RF and crystal oscillators, networks in FM and television equipment, pulse and counter circuits and frequency dividers, sawtooth generators, astable (free-running) multivibrators, logic gates, frequency modulation detectors.

03.329 Advanced Electronic Laboratory III

(Prereq. 03.328) 2 Q.H.*

Spectral studies of FM and PM waves; amplitude limiters. The balance modulators and single sideband generators. Binary adders, registers and counters, radio receiver testing, television receiver demonstration, analog computers. Pulse forming and delay lines, slotted lines, a series of five microwave experiments, and a series of four digital experiments.

03.410 Electrical Measurements

(Prereq. 03.454) 4 Q.H.

Measurement of voltage, current, power, resistance, capacitance, inductance, impedance, frequency, etc. Direct and substitution measurements. Evaluation of measured data, standard deviation and tolerance limits, instruments calibrations. Effects of residual impedance.

03.420 Electricity and Electronics I

(Prereq. 11.319) 4 Q.H.

Introduction to circuit analysis, resistive networks, periodic excitation function, steady state a-c circuits. The physical foundations of electronics and the physical operation of electronic devices.

03.421 Electricity and Electronics II

(Prereq. 03.420) 4 Q.H.

Single-stage electronic circuits, magnetic circuits and transformers, electro-mechanical energy conversion, d-c machines, a-c machines.

03.430 Energy Conversion

(Prereq. 03.452 and 10.422) 4 Q.H.

Generalized theory of rotating energy conversion devices. Steady state operation of the multiply excited direct-current machine. Control of speed; special machines. Steady state considerations of transformers; induction and synchronous machines. Generalized machine and circuit models, transfer functions, and flow chart analysis. Laplace transform techniques as applied to the analysis of dynamic operating modes of rotating machines.

03.437 Distributed Systems

(Prereq. 10.422) 4 Q.H.

Radiation, transmission, and reception of electromagnetic waves. Distributed constants and traveling waves of transmission lines. Differential equations of the uniform line.

03.440 Physical Electronics

(Prereq. 11.420) 4 Q.H.

Electron ballistics and applications. Properties of atoms and electrons as related to conduction of electricity in solids. Fundamentals of semiconductors, crystal diodes, and transistors. Theory of field-effect transistors, integrated circuits, and photoelectric devices.

03.451 Circuit Analysis I

(Prereq. 10.320, 11.319) 4 Q.H.

Ohm's law, Kirchoff's current and voltage laws, equivalent resistances and sources, mesh and modal analysis, network theorems, two-port networks and power relations—all with respect to direct currents. Energy storage, singularity functions; response of R, L, and C elements to singularities.

03.452 Circuit Analysis II

(Prereq. 03.451) 4 Q.H.

Complex, algebra, phasors, frequency domain, mutual inductance, transformers, steady-state a-c theory, driving point and transfer impedances, power and energy in a-c circuits.

*Including lab.

Laplace transforms; partial fraction expansion; Laplace transform techniques applied to the solution of RLC networks.

03.453 Circuits Analysis III

(Prereq. 03.452) 4 Q.H.

Application of differential equations to the solutions of linear, time-invariant electrical networks. Introduction to singularity functions, convolution, and time domain transient analysis. Network topology and duality, introduction to the methods of transformation calculus and complex frequency concepts.

03.454 Circuits Analysis IV

(Prereq. 03.453) 4 Q.H.

Signal analysis in the frequency domain. Fourier series. Fourier and Laplace transform methods. A varied selection of circuit problems are solved using Laplace transforms and related theorems.

03.460 Engineering Analysis I

(Prereq. 10.422 and 03.452) 4 Q.H.

Linear algebra and its application to circuit equations. Solution of linear differential equations, including an introduction to Laplace transforms.

03.461 Engineering Analysis II

(Prereq. 10.422) 4 Q.H.

Complex variables and their relevance to an electrical engineering program.

03.470 Digital Computers

(Prereq. 03.313 or concurrently) 4 Q.H.

Introduction to the field of digital computer design. Topics include: general computer organization, number systems and number representations, design characteristics of major computer units, Boolean algebra applications to computer design.

03.447 Control Engineering I

(Prereq. 03.454 and 10.422) 4 Q.H.

Analysis of linear servomechanisms under both transient and steady state conditions. Signal flow graphs. Laplace transforms used in the formulation of block diagrams and transfer function.

03.478 Control Engineering II

(Prereq. 03.477) 4 Q.H.

System stability. Root locus techniques. Treatment of Nyquist criteria and Bode diagram methods for systems evaluation.

03.490 Optical Instrumentation

(Prereq. 10.308 and 10.319) 4 Q.H.

Telescopes, microscopes, and other optical instruments as optical system components. Includes magnification, aberrations, resolution criteria, photometry. Compatibility of system components and optimization of systems. The basic nonimage-forming systems used for analysis control and metrology.

CHEMICAL ENGINEERING TECHNOLOGY

04.481 Nuclear Technology

(Prereq. 10.422 and 11.319) 4 Q.H.*

Atomic and nuclear structure; discovery and nature of radioactivity. Nuclear reactions and energy, induced nuclear transformations, neutron properties, applications of radio nuclides. Radiological safety: nuclear instrumentation for particle detection, monitoring, and experimentation. The fission process and its applications; nuclear reactors—their classification design and application; nuclear fuel processing; radioactive waste disposal. Supplemental laboratory experiments.

Graphic Science

09.104 Computer Programming

2 Q.H.

A special course offered primarily for engineering transfer students covering elementary programming methods using the FORTRAN language. Emphasis is on general programming, but examples are chosen from the various branches of engineering.

Prof. Rule

Fall Qtr.

*Including lab.

09.106 Basic Engineering

4 Q.H.

Introduction to engineering. Basic methods of communication (engineering drawing and pictorial representation). Use of the computer in engineering (FORTRAN programming). Input/output considerations, control statements including DO loops, subscripted variables. Prof. Rule and Staff

Fall, Winter, and Spring Qtrs.

09.107 Basic Engineering

(Prereq. 09.106) 4 Q.H.

Introduction to the design process. Involvement in original design projects requiring creative conceptual solutions. Review of several case studies showing the role of an engineer in problem solving. Continuation of computer programming as it applies in engineering. Use of the IBM Scientific Subroutine Package, computer graphics, numerical procedures.

Prof. Rule and Staff

Winter, Spring, and Summer Qtrs.

09.114 Introduction to Computers

2 Q.H.

A course given for biomedical majors, covering elementary aspects of FORTRAN programming as it applies to solving medical and engineering problems. Subscripted variables and nested DO loops are covered.

Prof. Rule

Winter Qtr.

09.115 Computer Programming

(Prereq. 09.114) 2 Q.H.

Higher-level programming techniques are developed, including writing of subprograms and making use of scientific subroutine packages. Graphical output using the CalComp plotter is covered.

Prof. Rule

Spring Qtr.

09.421 Principles of Computer Programming I

2 Q.H.

Rules for forming simple FORTRAN programs. Basic input/output techniques. FORMAT control. Algorithms for solving simple scientific problems. Computing large sums; maxima and minima in both discrete and continuous cases.

Prof. Rule and Staff

Fall and Winter Qtrs.

09.422 Principles of Computer Programming II

(Prereq. 09.421) 2 Q.H.

Extended capabilities of the FORTRAN language. Manipulation of vectors and arrays. Subroutine and function subprogramming. Continued applications of computers, sorting, merging, root determination. A-Format.

Prof. Rule and Staff

Winter and Spring Qtrs.

09.423 Principles of Computer Programming III

(Prereq. 09.422) 2 Q.H.

Use of scientific subroutines, simulation, random numbers. Introduction to numerical methods (solution of simultaneous equations, quadrature, derivatives). Use of plotter language. Display of information.

Prof. Rule and Staff

Spring Qtr.

09.461 Engineering Design Graphics I

2 Q.H.

Introduction to engineering drawing. Orthographic projection and primary auxiliary views. Reading and interpreting of multiview drawings. Isometric and oblique pictorial representation.

Prof. Rule and Staff

Fall and Winter Qtrs.

09.462 Engineering Design Graphics II

(Prereq. 09.461) 2 Q.H.

Emphasis on engineering drawings required to support engineering design, including standard conventions, dimensional and basic production processes. Shop detail drawings are covered. Exercise in design processes are given through selected projects and case studies.

Prof. Rule and Staff

Winter and Spring Qtrs.

09.463 Engineering Design Graphics III

(Prereq. 09.462) 2 Q.H.

Greater involvement in design by examination of many commonly used components. Case studies of large systems discussed in class. Advanced design projects assigned.

Prof. Rule and Staff

Spring Qtr.

09.464 Engineering Design Graphics IV

(Prereq. 09.463) 4 Q.H.

Graphical analysis of kinematics elements. Displacement, locus generators, velocity vectors,

and sliding motion. Simple, compound, and reverted gear trains. Acceleration analysis mechanism such as cams and linkages. Functions and scales, nomographs. Introduction to self-connecting (feedback) systems.

Prof. Rule and Staff

Winter Qtr.

Mathematics

10.100 Introduction to College Mathematics 4 Q.H.

A review of pre-college mathematics. Topics covered are operations with numbers, decimals, fractions, percentages, the equation of the straight line, algebra of polynomials. Intended primarily for freshman, but open to upper-class students having permission of the instructor.

Fall and Winter Qtrs.

10.101 Basic Mathematics 4 Q.H.

Development of real numbers and the algebraic operations, with emphasis placed on the field postulates. Study of polynomials, fractions, exponents, radical expressions, 1st- and 2nd-degree equations, solutions of inequalities.

Fall and Winter Qtrs.

10.102 Basic Mathematics (Prereq. 10.101) 4 Q.H.

Functions and relations, graphs, simple forms of conic sections, variation, exponential and logarithmic functions, systems of equations and inequalities.

Winter and Spring Qtrs.

10.103 Basic Mathematics (Prereq. 10.102) 4 Q.H.

Complex numbers, theory of equations, sequences and series, probability.

Spring and Summer Qtrs.

10.104 Fundamentals of Mathematics 4 Q.H.

System of coordinates; distance; slope; equations of lines. System of linear equations. Word problems. Elementary introduction to trigonometry. Elements of probability—samples spaces, events, conditional probability, combinatorics.

Fall, Winter, and Spring Qtrs.

10.105 Fundamentals of Mathematics (Prereq. 10.104 or equiv.) 4 Q.H.

Logarithms and their use. Functions. Derivatives and slopes of graphs. Derivative of x^n and of their linear combinations, their application in problems of maxima and minima. Type of concavity and inflection points. Sketching of the graph of a function. Anti-derivatives; area function and applications. Approximate computation of areas. Chain rule; product and quotient rules. Applications in rate problems.

Winter, Spring, and Summer Qtrs.

10.106 Calculus (Prereq. 3 1/2 units of college prep. math. or 10.103, 10.105) 4 Q.H.

A first course for upper-class students. Differential calculus for functions of one variable, topics in analytic geometry, some integration, applications of differentiation.

Fall and Winter Qtrs.

10.107 Calculus (Prereq. 10.106) 4 Q.H.

Techniques of differentiation and integration: maxima-minima problems, volume of revolution and applications to differential equations.

Winter, Spring, and Summer Qtrs.

10.108 Probability, Statistics and the Computer (Non-Math majors) 4 Q.H.

A computer-oriented introduction to statistical methods, with applications in the life sciences. FORTRAN language will be taught and used to handle problems in measurement of central tendencies, confidence limits, correlation and regression, and analysis of variance.

Spring and Summer Qtrs.

10.120 Introduction to Computers (Non-Math majors) (No Math. prereq.) 4 Q.H.

A nontechnical introduction to computers, their abilities and shortcomings, and their impact on learning society. Some of the questions to be raised are: Can computers think? How do

computers compose music, play chess and write poetry? Can computers reproduce? How does a computer work? What can be done about the data bank menace? Although this is not a course in computer programming, the student will learn to convince (i.e., program) the computer to do simple tasks for him.

Fall and Winter Qtrs.

10.124 Fundamentals of Mathematics

4 Q.H.

Study of operations involving real numbers, including factoring, exponents, functions, and quadratic equations. The course also covers matrices, determinants, and logarithms.

10.125 Fundamentals of Mathematics

4 Q.H.

Exponential and logarithmic functions; differential calculus, including definitions of derivative; power rule, chain rule, product and quotient rules; maximum and minimum theory; integral calculus, including definite and indefinite integrals; introduction to probability.

10.126 Mainstreams of Mathematics

4 Q.H.

Traces the development of mathematical thought by focusing on some of its most exciting concepts and their applications. Discussions, visual aids, mathematical games, and individual projects will supplement lectures and readings, enabling students with diverse backgrounds to rediscover mathematics. The level is non-technical and no more than high school algebra and geometry is assumed. Topics covered vary from year to year but may include: Babylonian and Mayan mathematics; number systems, logic and computers; ancient Greek contributions to modern mathematics; calculus and the scientific revolution; maps, networks and topology; art, symmetry and modern algebra and geometry. The course can be used to satisfy the math-science distribution requirement but not any major requirement.

Spring and Summer Qtrs.

10.140 Mathematical Analysis IV-V

(Prereq. Freshman calculus or equiv.) 5 Q.H.

Designed to prepare transfer students for numerical analysis and differential equations. Linear algebra, vector-valued functions, functions of several variables, multiple integration, infinite series, Taylor's theorem, complex numbers.

Fall Qtr.

10.150 Calculus

4 Q.H.

A first course in calculus of one variable, primarily for students in the College of Engineering. Differentiation, integration, and elementary applications. Interpolation, numerical integration, first- and second- order differential equations, vectors.

Fall, Winter, and Summer Qtrs.

10.151 Calculus

(Prereq. 10.150) 4 Q.H.

A continuation of 10.150.

Winter and Spring Qtrs.

10.152 Calculus

(Prereq. 10.151) 4 Q.H.

A continuation of 10.151.

Spring and Summer Qtrs.

10.153 Calculus

(Prereq. 10.152) 4 Q.H.

Solid analytic geometry, vectors, infinite series, partial derivatives, with applications.

Fall and Winter Qtrs.

10.154 Calculus

(Prereq. 10.153) 4 Q.H.

Multiple integration, complex variables, with applications. Complex numbers, linear algebra, and systems of linear differential equations.

Spring and Summer Qtrs.

10.155 Mathematical Analysis

(Prereq. 10.154) 4 Q.H.

Ordinary differential equations, with emphasis on methods of solution. Includes first-order equations, second-order linear equations with constant coefficients, and systems of first-order linear equations. (Intended primarily for engineering students.)

Fall and Winter Qtrs.

10.156 Mathematical Analysis

(Prereq. 10.155 and 09.107 or 09.105) 4 Q.H.

Part 1: Introduction to numerical analysis. The digital computer is used in root-evaluation, interpolation, and solution of differential equations.

Part 2: Fourier series and boundary value problems for partial differential equations. (Intended primarily for engineering students.)

Spring and Summer Qtrs.

10.160 Calculus for Biology Majors

4 Q.H.

A first course in calculus with inspiration from and applications to biology. Differentiation and integration of functions of one variable. Partial derivatives. Multiple integration, Taylor's formula and approximation methods.

Fall Qtr.

10.161 Calculus for Biology Majors II

(Prereq. 10.160) 4 Q.H.

Continuation of 10.160.

Winter Qtr.

10.162 Calculus for Biology Majors III

(Prereq. 10.161) 4 Q.H.

Continuation of 10.161.

Spring Qtr.

10.170 Geometry

(Prereq. a course in calculus) 4 Q.H.

Selected topics from advanced plane geometry in Euclidean style: i.e., collinear points, concurrent lines, duality, cross-ratio, harmonic division of segments, homogeneous coordinates, abridged notations, special theorems concerning points, lines, triangles, and circles (Euler, Desargues, Lemoine, Brocard, Brianchon, Feuerbach); the nine-point circle, inversion, reciprocation.

Fall and Winter Qtrs.

10.171 Geometry

(Prereq. 10.170) 4 Q.H.

Discussion of Euclid's definitions and postulates; examination in detail of the fifth postulate and other items leading to non-Euclidean geometry. Some special topics in non-Euclidean geometry of the hyperbolic and elliptic planes.

Spring and Summer Qtrs.

10.181 Calculus I

5 Q.H.

Primarily for mathematics, physics, and chemistry majors. Derivatives and integrals of functions of one variable. Applications to curve sketching, maxima and minima problems, area, moments, etc. Approximation methods including numerical integration, Newton's method, Taylor series, and power series. By the third quarter, students will be required to solve selected problems on the computer.

Fall and Winter Qtrs.

10.182 Calculus II

(Prereq. 10.181) 5 Q.H.

Continuation of 10.181.

Winter and Spring Qtrs.

10.183 Calculus III

(Prereq. 10.182) 5 Q.H.

Continuation of 10.182.

Spring and Summer Qtrs.

10.184 Calculus and Linear Methods I

(Prereq. 10.183) 4 Q.H.

Methods of calculus combined with vector analysis, used to study curves, surfaces and functions of several variables. Topics include: parameterization of lines and planes, tangents and normal vectors, partial derivatives, maxima and minima problems, linear approximation, and tangent planes. Some linear algebra.

Fall and Winter Qtrs.

10.185 Calculus and Linear Methods II

(Prereq. 10.184) 4 Q.H.

Continuation of 10.184. Multiple integration, line integrals, and exact differentials; various forms of Stokes' Theorem. More linear algebra.

Spring and Summer Qtrs.

10.186 Differential Equations and Linear Methods I

(Prereq. 10.183) 4 Q.H.

Ordinary differential equations and linear algebra. First order equations, higher order linear equations, systems of equations. Linear algebra includes eigenvalues and eigenvectors.

Fall and Winter Qtrs.

10.187 Differential Equations and Linear Methods II

(Prereq. 10.186) 4 Q.H.

Analysis of linear partial differential equations, (wave equations, heat equation and potential equation). Ordinary differential equations with boundary values, Fourier analysis, orthogonal functions, linear algebra of function spaces.

Spring and Summer Qtrs.

10.207 Differential Equations (Non-Math majors)

(Prereq. 10.183 or equiv.) 4 Q.H.

An introduction to first- and second-order differential equations, their solution by analytic, geometric and numerical methods and their application to problems in the physical and life sciences.

Spring and Summer Qtrs.

10.208 Probability I

(Prereq. 10.154 or 10.185) 4 Q.H.

Probability functions for finite and infinite spaces; conditional probability and independence; discrete and continuous probability distributions for one or more random variables; expectation; moments; binomial, Poisson, and normal distributions; central limit theorem.

Fall and Winter Qtrs.

10.209 Probability II

(Prereq. 10.208) 4 Q.H.

Selected topics including introduction to stochastic processes, with emphasis on Poisson processes and Markov chains.

Fall and Winter Qtrs.

10.211 Introduction to Fortran Programming I

2 Q.H.

This course covers the design of algorithms and their translation into computer programs, using the more elementary facilities of the FORTRAN language. Topics covered include: integer and real number computation; programs that repeat operations; programs that choose what actions they will perform and in what order; data input and output; use of arrays.

Fall Qtr.

10.212 Introduction to Fortran Programming II

(Prereq. 10.211 or equiv.) 2 Q.H.

Continuation of 10.211. A more in-depth coverage of the topics listed above along with: techniques of dividing the solution of large problems into smaller sub-tasks; writing of function and subroutine sub-programs; use and operations on logical variables; some character manipulation.

Winter Qtr.

10.213 Introduction to Fortran Programming III

(Prereq. 10.212 or a working knowledge of FORTRAN) 2 Q.H.

Covers the use of the features of the FORTRAN language to solve a variety of problems. Will include: methods to increase the efficiency of programs, sorting methods, game playing, advanced input and output techniques.

Spring Qtr.

10.214 Systems Programming

(Prereq. 2 or 3 quarters of programming) 4 Q.H.

Complete description of the machine language of one (MIX), and all features of the assembly language for it. Examples of different types of program organization. Programs to be written may include table look up and elementary list-processing techniques. Object: to give confident working knowledge of reading, writing, and debugging of assembly language programs.

Fall and Winter Qtrs.

10.215 Compilers I

(Prereq. Ability to write assembly language programs) 4 Q.H.

Basic data structures. Arrays, lists, trees, binary trees, stacks, queues, dequeues. Example of programs which need these structures to be efficient and fast. Uses of these techniques in running computer systems - symbol tables, storage allocation, compilers.

10.216 Compilers II

(Prereq. Knowledge of assembly language programming and some knowledge of data structures) 4 Q.H.

Project: to write (pieces of) a compiler from a higher-level language in machine language. Lectures on the construction of a compiler - lexical scan, syntax scan, object code generation, symbol table management, object code optimization techniques.

10.220 Mathematical Statistics

(Prereq. 10.208) 4 Q.H.

Estimation of parameters, confidence intervals, hypothesis testing, regression, sampling distributions. Introduction to analysis of variance and statistical decision theory.

Spring and Summer Qtrs.

10.221 Applied Analysis

(Prereq. 10.187) 4 Q.H.

Topics, at the discretion of instructor, chosen from: First order non-linear partial differential equations applied to traffic flow and other problems, calculus of variations, methods of applied math (Laplace transform, dimensional analysis, singular perturbations, special functions), and others.

Fall and Winter Qtrs.

10.222 Applied Analysis

(Prereq. 10.221) 4 Q.H.

Continuation of 10.221.

Spring and Summer Qtrs.

10.223 Numerical Analysis

(Prereq. Two years of calculus, FORTRAN programming) 4 Q.H.

A computer-oriented introductory course in numerical analysis. Methods for finding numerical solutions of nonlinear equations, systems of linear equations, ordinary differential equations, curve-fitting and interpolation problems, and evaluation of definite integrals are analyzed and programmed on a digital computer.

Fall and Winter Qtrs.

10.224 Numerical Analysis

(Prereq. 10.223) 4 Q.H.

A continuation of 10.223

Spring and Summer Qtrs.

10.226 Functions of a Complex Variable

(Prereq. 10.184 or equiv.) 4 Q.H.

Algebra and geometry of complex numbers. Concepts of limit, continuity, and derivative in the complex domain. Holomorphic functions, series, contour integration. Applications.

Fall and Winter Qtrs.

10.230 Linear Programming (Non-Math majors)

(Prereq. One year of college mathematics) 4 Q.H.

Introduction to concepts and techniques of linear programming, game theory, stochastic processes. Applications to economics, social sciences, and other related fields.

Fall and Winter Qtrs.

10.232 Multivariate Statistics

(Prereq. 10.220) 4 Q.H.

Methods of classification, estimation, and prediction based on several statistical variables.

Offered 1975-76, Spring and Summer Qtrs.

10.240 Mathematical Models in the Life Sciences

(Prereq. One year of calculus) 4 Q.H.

A course in the derivation and solution of mathematical models in the area of biology, psychology, and the social sciences. Such phenomena as population dynamics, diffusion processes, pollution, control systems, neural networks, and mathematical genetics are studied.

Fall and Winter Qtrs.

10.241 Mathematical Models in the Life Sciences

(Prereq. 10.240) 4 Q.H.

A continuation of 10.240.

Spring and Summer Qtrs.

10.246 Advanced Linear Algebra I

(Prereq. 10.187 or permission of instructor) 4 Q.H.

Vector spaces. Survey of main examples. Dimension. Detailed analysis of the behavior of a

linear transformation, with an emphasis on what kinds of phenomena can occur. Use of invariant subspaces and eigenvalues. Symmetric and orthogonal maps; iteration of linear maps. Linear, bilinear, and quadratic forms. Brief study of issues arising in practical computations.

Fall and Winter Qtrs.

10.247 Advanced Linear Algebra II

(Prereq. 10.246) 4 Q.H.

Further discussion of the topics in 10.246. Applications of linear algebra to various fields such as physics, statistics, geometry, differential equations, and function theory. Introduction to ideas related to ordinary linear algebra such as lattices, groups, and symmetry.

Note: Upper-level students who have not completed the 10.181-10.187 program may take 10.246-10.247. Such students should see the instructor in the course and inform him of their particular background.

10.250 Analysis I

(Prereq. 10.187 or consent of instructor) 4 Q.H.

The theoretical underpinnings of the calculus: limits, measure, continuity, and related concepts. Analysis I and II are intended to serve as a bridge between the 10.281-287 calculus sequence and the more advanced analysis courses such as 10.221-2, 10.226, and 10.264-5.

Fall and Winter Qtrs.

10.251 Analysis II

(Prereq. 10.250) 4 Q.H.

Continuation of 10.250. Once through the calculus again, armed with the concepts introduced in Analysis I.

Spring and Summer Qtrs.

10.256 Algebra

(Prereq. 10.246) 4 Q.H.

Theory of fields: field extensions, automorphisms, Galois theory. Applications to theory of equations.

10.257 Optimization and Mathematical Game Theory

(Prereq. Some linear algebra, e.g., 10.246 or consent of instructor) 4 Q.H.

Convex sets in Euclidean n -space, linear and nonlinear programming, zero-sum games, dynamic programming. Students are encouraged to program selected solution methods for a computer.

Winter and Spring Qtrs.

10.264 Recent Ideas in Geometry

(Prereq. 10.251 and 10.247 or consent of instructor) 4 Q.H.

Topics chosen by the instructor may vary each year. Topological classification of surfaces, theory of critical points and singularities of mappings, topological study of vector fields, knot theory, graph theory, differential geometry of surfaces, algebraic curves, homotopy.

Fall and Winter Qtrs.

10.265 Recent Ideas in Geometry

(Prereq. 10.264) 4 Q.H.

Continuation of 10.264.

Spring and Summer Qtrs.

10.271 Foundations of Mathematics

(Prereq. 10.250 or equiv.) 4 Q.H.

Logic and set theory.

Fall and Winter Qtrs.

To be offered alternate years.

10.272 Foundations of Mathematics

(Prereq. 10.271) 4 Q.H.

Continuation of 10.271.

Spring and Summer Qtrs.

To be offered alternate years.

10.273 History of Mathematics

4 Q.H.

Development of the various branches of mathematics; lives of outstanding mathematicians; growth of mathematical knowledge and its relation to culture.

Fall and Winter Qtrs.

10.274 Number Theory

(Prereq. 10.246 or consent of instructor) 4 Q.H.

Properties of integers, divisibility, congruences, and topics chosen from: magic squares, diophantine equations, continued fractions, or quadratic fields. No specific subject matter is a prerequisite, but it is recommended that the student complete the sequence 10.181-10.187 and 10.246 before taking this course, in order to have sufficient "mathematical maturity."

Spring and Summer Qtrs.

10.281-10.289 Directed Study

(Prereq. Consent of instructor)

Programs of directed study, held one or more quarters, are available for highly motivated students who wish to explore mathematical phenomena and theories more deeply. In particular, a freshman-sophomore directed study program, emphasizing discussion of concepts and independent research, runs concurrently with the calculus sequence (beginning in the winter of the freshman year). Past discussions have included these topics: measure by covering and packing, lattices, symmetry, theory of numbers, and classification of surfaces.

All Qtrs.

10.295, 10.296, 10.297, 10.298 Honors Program

(each) 4 Q.H.

10.307 College Algebra and Trigonometry

(Prereq. Math Placement Test or 10.302) 4 Q.H.

Fundamental operations of algebra, algebraic fractions, exponents and radicals, functions. Trigonometric functions of angles both in degree and in radian measure; right triangles; identities and equations.

Fall and Winter Qtrs.

10.308 College Algebra and Trigonometry II

(Prereq. 10.307) 4 Q.H.

Quadratic equations and applications, radical equations, complex numbers, binomial expansion, variation, roots of polynomial equations. Trigonometric graphs, other transcendental functions, logarithms, inverse trigonometric functions.

Winter and Spring Qtrs.

10.320 Calculus I

(Prereq. 10.308, 10.329, or 10.335) 4 Q.H.

Functions, graphs, and limits; study of the straight line, the circle, the parabola; differentiation of algebraic functions, with applications, including curve-sketching.

Spring and Summer Qtrs.

10.421 Calculus A

(Prereq. 10.320) 4 Q.H.

Applications of derivatives to curve-sketching, anti-differentiation, the definite integral with applications, calculus of non-algebraic functions—logarithmic, exponential, and trigonometric. Calculus of inverse trigonometric functions, techniques of integration, polar coordinates, the conic sections, vectors in a plane, indeterminate forms, L'Hopital's rule.

Fall and Winter Qtrs.

10.422 Calculus B

(Prereq. 10.421) 4 Q.H.

Calculus of functions of several variables, partial differentiation, multiple integrals, infinite series. Vector analysis; matrices and linear algebra.

Spring and Summer Qtrs.

10.423 Differential Equations

(Prereq. 10.422) 4 Q.H.

Ordinary differential equations—standard types of the first order; linear differential equations, especially with constant coefficients; Laplace transforms; series solutions of differential equations. Fourier series and orthogonal functions.

Physics

Courses are listed according to level and degree of specialization, and are not in numerical order. General Interest Courses have no prerequisite and may be used to satisfy science requirements. Introductory Physics Courses are basic first-year physics lecture courses; the corresponding laboratories are listed under Introductory Physics Laboratories. Advanced Physics and Astronomy courses require one year of introductory physics and may be used to

satisfy degree requirements for physics majors. Courses marked with a dagger (†) are offered for students in the full-time day program in Lincoln College; they do not fulfill credit requirements in the College of Liberal Arts.

GENERAL INTEREST COURSES

11.109 Physics in Music

4 Q.H.

Discusses the physical principles involved in the production, recording and reproduction of music. Topics include: explanations of how various instruments work in terms of the basic properties of resonances and waves; physical and psychological response of the ear; the physical basis of the modern (well-tempered) system of tuning; how microphones, amplifiers, loudspeakers, tape recorders, radios, and other devices work.

Spring Qtr.

11.141 Energy and Society I

4 Q.H.

Historical development of the concept of energy. Uses of energy in primitive, developing and technological societies. The physical nature of energy. Conservation, transmission and storage of energy. Power plants and energy resources. The problems of growth, depletion and planning.

Fall Qtr.

11.142 Energy and Society II

(Prereq. 11.141) 4 Q.H.

Chemical and nuclear energy sources. Generation of electrical energy. Alternative sources of energy: coal, solar, geothermal, tidal, fusion. Alternative in the use of energy: conservation and improved efficiency. Environmental and societal impact of energy.

Spring Qtr.

11.180 Introduction to Astronomy I

4 Q.H.

The first quarter of a two-quarter course. The purpose of the course is to introduce the non-science student to modern astronomical ideas, many of which have been developed over the past decade. No mathematics or science prerequisites are assumed. Mathematical discussions are kept to a minimum and use only arithmetic and elementary geometry. The lectures will be coordinated with several evening viewing sessions through the Department's 8" reflecting telescope. The following topics will be covered: The Earth in Space (motion of the Earth, Solar and Lunar eclipses); Tools of the Astronomer (the nature of light, telescopes, radio telescopes); Solar System (the planets; knowledge gained from Mariner flights; asteroids, comets and meteors; origin of Solar System, origin of life), the Sun; Properties of Stars; Stellar sizes; Multiple stars; Variable stars; Life and death of stars (nuclear reactions and energy sources; birth of stars; main-sequence stars; red giants; white dwarfs; supernovas; neutron stars and pulsars; black holes); Galaxies (the Milky Way; size of galaxy; types of galaxies; evolution of galaxies; galactic distances; quasars); Cosmology (the expanding universe; the big bang theory; the Universe in the distant future).

Winter Qtr.

11.181 Introduction to Astronomy II

(Prereq. 11.180) 4 Q.H.

Continuation of 11.180.

Spring Qtr.

INTRODUCTORY PHYSICS COURSES

11.113 Physics for Criminal Justice Students I

4 Q.H.

The first quarter of a two-quarter course intended to serve both as a basis for advanced study of criminalistics and an introduction to the physical sciences for students specializing in other areas of criminal justice. A broad range of topics is covered, from ballistics to atomic and molecular structure. Emphasis is placed on physical fundamentals rather than on mathematical rigor. Examples taken from case histories are used to illustrate the application of basic physical laws in realistic crime-lab and courtroom situations. These include: calculation of bullet and blood-spatter trajectories, possible and impossible traffic violations, the cooling curve of cadavers and its relation to the time of death, the human vocal frequency spectrum and the use of "voice-prints," the optical spectrum and spectroscopic identification

of materials, Doppler shift and radar speed measurements, and the relation of microscopic structure to the fracture and deformation properties of solids.

Fall and Winter Qtrs.

11.114 Physics for Criminal Justice Students II

(Prereq. 11.113) 4 Q.H.

Continuation of 11.113.

Spring and Summer Qtrs.

11.117 Physics for Science Majors I

(Prereq. A beginning calculus course concurrently) 4 Q.H.

Mechanics: kinematics, Newton's laws, circular motion, inclined planes, conservation laws, collisions, potential energy diagrams, harmonic motion.

Fall and Winter Qtrs.

11.118 Physics for Science Majors II

(Prereq. 11.117) 4 Q.H.

Thermodynamics and relativity: kinetic theory, the First Law and work, ideal gases, heat engines, relativity.

Fall and Winter Qtrs.

11.119 Physics for Science Majors III

(Prereq. 11.117) 4 Q.H.

Waves and electricity: the wave equation in one dimension, superposition, waves in two dimensions, interference and physical optics; electrostatics, Gauss's law, potential and line integrals; Bohr atom, deBroglie waves, photoelectric effect, X-ray diffraction; charged particles in magnetic fields.

Spring and Summer Qtrs.

11.171 Physics for the Life Sciences I

4 Q.H.

Vector addition of force, principles of statics, Newton's second law, kinetic and potential energy, pressure, static properties of fluids, fluid flow.

Fall and Winter Qtrs.

11.172 Physics for the Life Sciences II

(Prereq. 11.171) 4 Q.H.

Wave motion, sound, light, optics, static electricity, DC circuits, magnetism.

Spring and Summer Qtrs.

11.175 Physics for the Life Sciences III

(Prereq. 11.171) 4 Q.H.

Temperature, gas laws, properties of liquids (surface tension and osmotic pressure), properties of solids, thermal physics, Coulomb's law, atomic and nuclear physics.

Spring and Summer Qtrs.

11.176 Physics for Psychology I

4 Q.H.

A two-quarter sequence intended primarily for psychology majors. The geometrical nature of physical laws; probability and statistics in physics; mechanics, kinematics, and energy. Light; sound; electricity and magnetism. Topics in modern physics such as atomic and nuclear structure, cosmology.

Fall Qtr.

11.177 Physics for Psychology II

(No prereq.) 4 Q.H.

Continuation of 11.176.

Spring Qtr.

11.203 Physics for Engineering Students I

4 Q.H.

The first quarter of a four-quarter sequence intended primarily for engineering students. The student is assumed to be taking a four-quarter calculus sequence concurrently. The aim of the course is to give the student a working knowledge of physics. The first quarter deals with vector algebra and the dynamics of particle motion.

Fall and Winter Qtrs.

11.204 Physics for Engineering Students II

(Prereq. 11.203) 4 Q.H.

Continuation of 11.203. Conservation laws and their use in solving problems in elementary dynamics. Wave motion and vibrating systems.

Winter and Spring Qtrs.

11.205 Physics for Engineering Students III

(Prereq. 11.204) 4 Q.H.

Continuation of 11.204. Electricity and magnetism.

Spring and Summer Qtrs.

11.206 Physics for Engineering Students IV

(Prereq. 11.205) 4 Q.H.

Continuation of 11.205. Circuit theory, electromagnetic waves, light.

Fall and Winter Qtrs.

11.126 Physics Review

(Prereq. One year of physics) 4 Q.H.

A special review course on the material of 11.203, 11.204, 11.205, and 11.206. The course is geared to the student's needs. Passing is equivalent to passing 11.206.

Fall Qtr.

11.317† Physics I

(Prereq. 10.307 or concurrently) 4 Q.H.

Kinematics and dynamics of particle motion, Newton's laws, projectile and circular motion, conservation laws for momentum and energy, rotational motion, simple harmonic motion.

Fall and Winter Qtrs.

11.318† Physics II

(Prereq. 11.317) 4 Q.H.

Wave motion, intensity, interference phenomena, Doppler effect, vibrating systems, temperature, heat, change of state, heat transfer, kinetic theory of gases, general gas laws, thermodynamics.

Winter and Spring Qtrs.

11.319† Physics III

(Prereq. 11.318) 4 Q.H.

Electrostatics, magnetism, magnetic induction, induced currents, direct and alternating current circuits, properties of light, reflection, refraction, dispersion, optical systems, diffraction, polarization.

Spring Qtr.

11.420† Physics IV

(Prereq. 11.319) 4 Q.H.

Static electric and magnetic fields. Experimental basis for Maxwell's equations. Electromagnetic waves.

Fall and Winter Qtrs.

INTRODUCTORY PHYSICS LABORATORIES**11.110 Physics Laboratory for Engineering Students I**

(Prereq. 11.205) 1 Q.H.

The first quarter of a two-quarter laboratory sequence in which the student performs experiments from various fields of physics.

Fall and Winter Qtrs.

11.111 Physics Laboratory for Engineering Students II

(Prereq. 11.110) 1 Q.H.

Continuation of 11.110.

Spring and Summer Qtrs.

11.124 Physics Laboratory for Science Majors I

(Prereq. 11.117) 1 Q.H.

The first quarter of a two-quarter laboratory sequence in which students perform experiments from various fields of physics.

Fall and Winter Qtrs.

11.125 Physics Laboratory for Science Majors II

(Prereq. 11.124) 1 Q.H.

Continuation of 11.124.

Spring and Summer Qtrs.

11.173 Physics Laboratory for the Life Sciences I

(Prereq. 11.117 or 11.171 concurrently) 1 Q.H.

The first quarter of a two-quarter laboratory sequence that accompanies 11.171 and 11.172. The student performs experiments from various fields of physics.

Fall and Winter Qtrs.

11.174 Physics Laboratory for the Life Sciences II

(Prereq. 11.173) 1 Q.H.

Continuation of 11.173.

Spring and Summer Qtrs.

11.373† Physics Laboratory I

2 Q.H.

Experiments from various physics topics that have been covered in 11.317 and concurrently in 11.318.

Fall and Winter Qtrs.

11.374† Physics Laboratory II

(Prereq. 11.373) 2 Q.H.

A continuation of 11.373, with experiments from topics in 11.318 and 11.319.

Spring and Summer Qtrs.

ADVANCED PHYSICS AND ASTRONOMY COURSES**11.127 Intermediate Physics I**

(Prereq. 11.119) 4 Q.H.

Electricity and magnetism: review of electrostatics, Maxwell's equations in integral form, radiation and velocity of light; DC and AC circuits, impedance, electrical oscillations and mechanical analogs, damped oscillations, resonance; geometrical optics.

Fall and Winter Qtrs.

11.128 Intermediate Physics II

(Prereq. 11.119)) 4 Q.H.

The electromagnetic force: qualitative description of molecular interaction, dipoles, van der Waals equation, real gases, condensation pV diagrams for gases, liquids, solids, crystals; angular momentum conservation, Bohr atom and quantization, Pauli principle, spin, Periodic table.

Spring and Summer Qtrs.

11.182 Astrophysics and Cosmology I

(Prereq. 11.118 or 11.119 or 11.204) 4 Q.H.

The first quarter of a two-quarter course. The purpose of the course is to introduce the student who has had two quarters of elementary physics to present ideas in astrophysics and cosmology. Emphasis is placed on surveying recent advances in this field. The mathematics used is mainly geometry, trigonometry and algebra. Topics to be covered include: Tools of the Astronomer (telescopes, radio telescopes, spectroscopes); stellar properties (distances, stellar radii, magnitude and luminosity); stellar spectra; Hertzsprung-Russell diagram; stellar energy sources (gravitational energy, stellar nuclear reactions); evolution of stars (birth, main sequence, red giants, white dwarfs, supernovas, neutron stars and pulsars, black holes and gravitational collapse); Milky Way (galactic rotation, galactic nucleus; cosmic rays); extragalactic objects (masses of galaxies, clusters of galaxies, galactic distances, radio galaxies, Quasars); cosmology (Olber's paradox; recession of galaxies; big bang theory; 3°K radiation; formation of galaxies; the Universe in the distant future.)

Fall Qtr.

11.183 Astrophysics and Cosmology II

(Prereq. 11.182) 4 Q.H.

Continuation of 11.182.

Spring Qtr.

11.200 Intermediate Mechanics I (Prereq. 11.128 or 11.205, and 10.205 or 10.145) 4 Q.H.

The first quarter of a two-quarter sequence in classical mechanics. Vector analysis, kinematics and dynamics of particle motion, generalized coordinates, and Lagrange's equations of motion.

Fall and Winter Qtrs.

11.201 Theoretical Mechanics II

(Prereq. 11.119) 4 Q.H.

Conservation theorems, central force motion, systems of particles, rigid body motion, Hamilton's equation.

Spring and Summer Qtrs. of odd years.

11.207 Elementary Modern Physics

(Prereq. 11.206 or 11.128) 4 Q.H.

Special relativity and quantum physics. The properties of light and the structure of atoms and nuclei. Primarily intended for Engineering and Chemistry majors.

Spring and Summer Qtrs.

11.208 Mathematical Physics

(Prereq. 11.218 or 11.206 and 10.205 or 10.145) 4 Q.H.

Review of linear algebra and vector calculus. Special functions and partial differential

equations of physics. Potential theory. Functions of a complex variable.

Spring and Summer Qtrs. of even years.

11.21A (B, C, etc.) Independent Study	1 Q.H.
11.22A (B, C, etc.) Independent Study	2 Q.H.
11.23A (B, C, etc.) Independent Study	3 Q.H.
11.24A (B, C, etc.) Independent Study	4 Q.H.

All Qtrs.

11.211 Electricity and Magnetism I

(Prereq. 11.128 or 11.206 and 11.208 or 10.207 or 10.221) 4 Q.H.

The first quarter of a two-quarter sequence in electromagnetic theory. Maxwell's equations and their experimental basis; electrostatics and magnetostatics; the electromagnetic field in empty space; electromagnetic waves.

Fall and Winter Qtrs.

11.212 Electricity and Magnetism II

(Prereq. 11.211) 4 Q.H.

Continuation of 11.211. Energy and momentum in the electromagnetic field. Electrodynamics; the interaction of matter and the field. Radiation.

Spring Qtr.

11.220 Thermodynamics and Kinetic Theory

(Prereq. 11.128 or 11.206 and 10.205 or 10.145) 4 Q.H.

First and second laws of thermodynamics. Entropy and equilibrium. Thermodynamic potentials. Elementary kinetic theory. Statistical mechanics and the statistical interpretation of entropy.

Fall and Summer Qtrs.

11.221 Wave Motion and Optics

(Prereq. 11.119) 4 Q.H.

Harmonic and coupled oscillators, wave equation. Geometrical and physical optics; interference, diffraction, optics of solids, amplification of light; lasers.

Winter Qtr.

11.230 Modern Physics

(Prereq. 11.128 or 11.207 and 10.205 or 10.145) 4 Q.H.

A review of experiments demonstrating the atomic nature of matter, the properties of the electron, the nuclear atom, the wave-particle duality, spin, and the properties of elementary particles. The course discusses, mostly on a phenomenological level, such subjects as atomic and nuclear structure, properties of the solid state, and elementary particles.

Fall and Winter Qtrs.

11.240 Quantum Mechanics I

(Prereq. 11.230, 10.207) 4 Q.H.

The first of a two-quarter sequence in quantum mechanics. Observations of macroscopic and microscopic bodies. The uncertainty principle, wave particle duality, probability amplitudes, Schrodinger wave theory, and one-dimensional problems.

Fall and Winter Qtrs.

11.241 Quantum Mechanics II

(Prereq. 11.240) 4 Q.H.

Continuation of 11.240. Discrete and continuous states, Schrodinger equation in three dimensions, angular momentum, general theory of quantum mechanics, applications.

Spring Qtr.

11.246 Electronics and Data Analysis I

(Prereq. 11.119 or 11.206) 4 Q.H.*

A two-quarter course intended to teach those electronic and data-analysis techniques that are common to research in all fields of experimental physics. Subjects in electronics will be: principles of semiconductor devices; analog techniques including feedback and servo loops, and wideband amplification; digital techniques including integrated circuits and logic techniques; design of electronic subsystems such as counters, analog-to-digital converters and phase-sensitive detectors. Subjects in data analysis will be probability theory;

*Including lab.

distribution functions; fitting data with a hypothesis; error estimation. Time permitting, high-vacuum techniques, cryogenic techniques, and lasers may also be covered.

Summer Qtr.

11.247 Electronics and Data Analysis II

(Prereq. 11.246) 4 Q.H.*

Continuation of 11.246.

Spring Qtr.

11.260 Wave Laboratory

(Prereq. 11.128 or 11.206) 4 Q.H.

A general treatment of the problems of mechanical and electromagnetic radiation as wave phenomena. The differential wave equation and its application to selected topics. Interference and diffraction theory from the standpoint of the Huygens-Fresnel and Kirchoff formulations. Selected experiments in acoustics, optics, and microwaves to illustrate these problems.

Fall and Winter Qtrs.

11.272 Experimental Laboratory

(Prereq. 11.271) 3 Q.H.

Experiments investigating the atomic nature of matter, the properties of the electron, and special relativity. The work involves vacuum system techniques and machine-shop practice.

Fall Qtr.

11.273 Advanced Physics Laboratory

(Prereq. 11.272) 3 Q.H.

Special projects in modern experimental physics.

Fall Qtr.

11.281 Properties of Matter

(Prereq. 10.205, 11.128, or 11.206) 4 Q.H.

The quantitative description of solids, liquids, and gases. Topics include: the kinetic theory of gases (distribution functions, collisions, viscosity, thermal conductivity, diffusion), gas imperfection, real gases, the transition to the liquid phase, amorphous and crystalline solid structure, alloys and the metallurgical phase diagram, imperfections in solids.

11.282 Introduction to Solid State Physics

(Prereq. 11.281 or 11.220) 4 Q.H.

A semi-classical treatment of the thermal, magnetic, and electrical properties of crystalline solids. Topics include: x-ray diffraction and the reciprocal lattice, elasticity and lattice vibrations, specific heat, properties of insulators, magnetism in insulators and in metals, introduction to the band theory of metals.

Spring Qtr.

11.285 Introduction to Nuclear Physics

(Prereq. 11.200) 4 Q.H.

Nuclear structure, nuclear masses, radioactivity, nuclear radiation, interaction of radiation and matter, detectors, fission, nuclear forces, elementary particles.

Winter Qtr.

11.295, 11.296, 11.297, 11.298 Honors Program

(each) 4 Q.H.

All Qtrs.

Chemistry

12.101 General Chemistry

3 Q.H.*

Introduction to the principles of chemistry, with emphasis on stoichiometry, ionic solutions, and the inorganic chemistry of biological systems.

Prof. Spinos

Fall Qtr.

12.102 General Chemistry

(Prereq. 12.101) 3 Q.H.*

Introduction to organic chemistry, with emphasis on compounds of biological significance.

Prof. Spinos

Winter Qtr.

12.103 General Chemistry

5 Q.H.*

For Chemistry majors and selected students in other majors, such as Biology, Physics, etc.

*Including lab.

Stoichiometry, atomic structure, chemical bonding, acids and bases, oxidation-reduction, states of matter, solutions. Laboratory: introduction to qualitative analysis.

Prof. Roebber

Fall Qtr.

12.104 General Chemistry

(Prereq. 12.103) 5 Q.H.*

For Chemistry majors and selected students in other majors, such as Biology, Physics, etc. Electronic structure and chemical properties, covalent bonding, coordination compounds, topics in organic chemistry, chemical equilibria, introduction to chemical thermodynamics and kinetics. Laboratory: qualitative analysis.

Prof. Roebber

Winter Qtr.

12.105 Analytical Chemistry

(Prereq. 12.104) 5 Q.H.*

Theory, apparatus, operations, and interpretation of observations for a broad spectrum of present-day methods of chemical analysis, including electrical, optical, gravimetric, and titrimetric techniques.

Prof. Jankowski

Spring Qtr.

12.106 General Chemistry

5 Q.H.*

For non-Chemistry majors. Basic concepts and definitions, the mole concept and chemical stoichiometry, states of matter, solutions, periodicity of elements, atomic structure, chemical bonding and reactions.

Profs. Cass and Davies

Fall and Winter Qtrs.

12.107 General Chemistry

(Prereq. 12.106) 5 Q.H.*

For non-Chemistry majors. Chemical kinetics and equilibria, acids and bases, elementary thermodynamics, electrolysis and electrochemistry, chemistry of representative elements, nuclear chemistry, introduction to organic chemistry.

Prof. Cass

Winter, Spring, and Summer Qtrs.

12.108 Fundamentals of Chemical Sciences I

4 Q.H.

Development and discussion of important principles and concepts of the chemical sciences. Intended for students in the social sciences and humanities with minimal background in science and mathematics. The objective of 12.108-.109 is to give the non-science student an appreciation and some knowledge of the role of chemistry in our technological society and in our everyday lives.

Prof. Weiss

Fall and Winter Qtrs.

12.109 Fundamentals of Chemical Sciences II

(Prereq. 12.108) 4 Q.H.

Continuation of 12.108. Discussion of the chemistry involved in such basic human needs as food, clothing, shelter, transportation, and energy production. Other topics (e.g., environmental problems) may be included or substituted, since students will participate in selection of topics for discussion.

Prof. Weiss

Spring Qtr.

12.114 General Chemistry

4 Q.H.

Primarily for engineering students. Introduction to the principles of chemistry, focusing upon the states and structure of matter and chemical stoichiometry.

Profs. Reiff and Keller

Fall, Winter, and Spring Qtrs.

12.115 General Chemistry

(Prereq. 12.114) 4 Q.H.

Primarily for engineering students. Introduction to the principles of chemistry, focusing upon chemical equilibria and the nature of some common materials.

Profs. Halpern and Keller

Winter, Spring, and Summer Qtrs.

12.118 General Chemistry Laboratory

1 Q.H.

Optional laboratory for 12.115 (General Chemistry for engineering students). Experiments pertaining to lecture material.

Prof. Halpern

Winter and Spring Qtrs.

12.139 General Chemistry

4 Q.H.*

For students in the College of Criminal Justice. Structure of matter; physical and chemical

*Including lab.

properties of metallic and nonmetallic elements, inorganic compounds, and alloys; stoichiometry; solids, liquids, and solutions. Laboratory experiments illustrate basic chemical principles and representative chemical reactions.

Profs. Jankowski and Howell

Fall and Winter Qtrs.

12.140 General Chemistry

(Prereq. 12.139) 4 Q.H.*

For students in the College of Criminal Justice. Continuation of 12.139, with emphasis on application of principles. Chemical reactivity, acids and bases, oxidation-reduction, physical and chemical properties of organic compounds. Laboratory continues studies of the first quarter.

Profs. Howell and Jankowski

Spring and Summer Qtrs.

12.144 Organic Chemistry

(Prereq. 12.104 or 12.107) 5 Q.H.*

Nomenclature, preparation, properties, and reactions of common organic compounds.

Profs. Jones and Quick

Fall and Winter Qtrs.

12.145 Organic Chemistry

(Prereq. 12.144) 5 Q.H.*

Continuation of 12.144.

Profs. Jones and Quick

Spring and Summer Qtrs.

12.147 Organic Chemistry

(Prereq. 12.115) 4 Q.H.*

Aliphatic compounds; preparation, properties, and reactions of the more common classes of open-chain compounds; electronic interpretation of structures and reactions; petrochemicals; synthetic resins; carbohydrates; fats; proteins.

Prof. Howell

Fall and Winter Qtrs.

12.148 Organic Chemistry

(Prereq. 12.147) 4 Q.H.*

Aromatic compounds; preparation, properties, and reactions of the more common classes of aromatic compounds; electronic interpretation of structures and reactions of aromatic compounds; dyes, commercial solvents, and important industrial products. A brief introduction to alicyclic and heterocyclic compounds.

Prof. Howell

Spring and Summer Qtrs.

12.153 Organic Chemistry

(Prereq. 12.105) 3 Q.H.

Syntheses and properties of aliphatic and aromatic hydrocarbons and their functional derivatives; correlation between the structure of organic compounds and their physical and chemical properties; electronic interpretation of organic reactions.

Prof. LeQuesne

Fall and Winter Qtrs.

12.154 Organic Chemistry

(Prereq. 12.153) 5 Q.H.*

Continuation of 12.153.

Prof. LeQuesne

Spring and Summer Qtrs.

12.155 Organic Chemistry

(Prereq. 12.154) 5 Q.H.*

Continuation of 12.154.

Prof. Viola

Fall and Winter Qtrs.

12.161 Physical Chemistry

(Prereq. 10.152 and 11.118 or equiv.) 4 Q.H.*

Chemical thermodynamics.

Prof. Wiener

Fall and Winter Qtrs.

12.162 Physical Chemistry

(Prereq. 12.161) 4 Q.H.*

Phase equilibria, solutions, kinetic theory of gases, chemical kinetics.

Prof. Wiener

Spring and Summer Qtrs.

12.166 Physical Chemistry

(Prereq. 10.183 and 11.118 or equiv.) 3 Q.H.

Similar to 12.161, but without laboratory.

Prof. Wiener

Fall and Winter Qtrs.

12.169 Physical Chemistry

(Prereq. 12.161 or 12.166) 3 Q.H.

Similar to 12.162, but without laboratory.

Prof. Wiener

Spring and Summer Qtrs.

*Including lab.

12.170 Physical Chemistry

(Prereq. 12.162 or 12.169) 3 Q.H.

Quantum chemistry, particles and waves, Schroedinger wave mechanics, the chemical bond.
 Profs. Halpern and Wiener Fall and Winter Qtrs.

12.171 Analytical Chemistry

(Prereq. 12.107 or equiv.) 4 Q.H.*

Theories, principles, and application of volumetric, gravimetric, and instrumental methods of analysis.

Prof. Spinos

Fall, Winter, and Spring Qtrs.

12.180 Ocean Chemistry

(Prereq. 12.105, 12.171, or equiv.) 4 Q.H.*

Principles and practices of chemical and instrumental methods in current use in marine investigations, with emphasis on procedures, apparatus, and interpretation of experimental observations. Laboratory exercises include: chlorinity and salinity measurements, biological oxygen demand, trace nutrient measurement, carbonate alkalinity, heavy metal pollutants, and selected projects.

Prof. Jankowski

Spring Qtr.

12.181 Instrumental Analysis

(Prereq. 12.105 or 12.171) 3 Q.H.

Theory, procedures, operations, and apparatus used in instrumental analysis, with emphasis on interpretation of results from typical scientific investigations. Current practices in the following methods are included: atomic absorption, ultraviolet and infrared absorption, voltammetry, anodic stripping, coulometry, gas chromatography, high-speed liquid chromatography, radio-tracer techniques, and neutron activation analysis.

Prof. Jankowski

Fall and Winter Qtrs.

12.185 Inorganic Chemistry

(Prereq. 12.105) 2 Q.H.

Atomic properties of free atoms and ions. Ionic bonding and the structure of the solid state. The Madelung calculation; the Born-Haber and other thermodynamic cycles. Valence-bond and molecular orbital theories of bonding. Stereochemistry of compounds of representative elements. Electron-deficient compounds.

Prof. Davies

Spring and Summer Qtrs.

12.189 Biochemistry Laboratory II

(Prereq. 93.151 or equiv.) 2 Q.H.*

Special projects in biochemical experimentation.

Staff

Spring Qtr.

12.200 Principles of Experimental Chemistry

(Prereq. 12.166) 2 Q.H.

Instrumentation, measurements, and evaluation. Basic electronics and optics, statistical methods, computer techniques.

Prof. Keller

Spring and Summer Qtrs.

12.201 Integrated Chemistry Laboratory I

(Prereq. 12.166) 2 Q.H.*

Procedures and techniques, experiments in basic electronics and optics, vacuum system design, and data processing.

Prof. Keller

Spring and Summer Qtrs.

12.202 Integrated Chemistry Laboratory II

(Prereq. 12.201) 3 Q.H.*

Integrated experiments in inorganic, analytical, and physical chemistry; compound preparation, characterization, and property studies.

Prof. Keller

Fall and Winter Qtrs.

12.213 Advanced Inorganic Chemistry

(Prereq. 12.170) 4 Q.H.

Periodic properties of representative elements and their compounds. General theories of acid and base behavior. Spectral and magnetic properties of transition metal compounds. Crystal field and molecular orbital theories of bonding. Kinetics and thermodynamics of reactions of transition metal compounds.

Prof. Davies

Spring and Summer Qtrs.

12.252 Advanced Organic Chemistry I

(Prereq. 12.155 or 12.145) 3 Q.H.

Organic structure and reactions. Corresponds to graduate course 12.861.

Prof. LeQuesne

Fall Qtr.

*Including lab.

- 12.253 Identification of Organic Compounds** (Prereq. 12.155) 3 Q.H.*
Qualitative analysis of organic compounds and mixtures, using physical, chemical, and instrumental methods.
Prof. Howell Spring and Summer Qtrs.
- 12.254 Advanced Organic Chemistry II** (Prereq. 12.152) 3 Q.H.
Organic structure and reactions. Corresponds to graduate course 12.862.
Prof. LeQuesne Winter Qtr.
- 12.255 Advanced Organic Chemistry III** (Prereq. 12.252 or 12.254) 3 Q.H.
Organic structure and properties. Corresponds to graduate course 12.863.
Prof. LeQuesne Spring Qtr.
- 12.257 Advanced Analytical Chemistry I** (Prereq. 12.181) 3 Q.H.
Analytical separations. Corresponds to graduate course 12.821.
Prof. Karger Fall Qtr.
- 12.258 Advanced Analytical Chemistry II** (Prereq. 12.181) 3 Q.H.
Electronanalytical. Corresponds to graduate course 12.822.
Prof. Keller Winter Qtr.
- 12.259 Advanced Analytical Chemistry III** (Prereq. 12.181) 3 Q.H.
Optical methods of analysis. Corresponds to graduate course 12.823.
Staff Spring Qtr.
- 12.262 Advanced Physical Chemistry I** (Prereq. 12.170) 3 Q.H.
Chemical thermodynamics. Corresponds to graduate course 12.881.
Prof. Roebber Fall Qtr.
- 12.263 Advanced Physical Chemistry II** (Prereq. 12.170) 3 Q.H.
Atomic and molecular structure. Corresponds to graduate course 12.885.
Prof. Halpern Winter Qtr.
- 12.264 Advanced Physical Chemistry III** (Prereq. 12.170) 3 Q.H.
Chemical kinetics. Corresponds to graduate course 12.893.
Prof. Roebber Spring Qtr.
- 12.271, 12.272, 12.273,** (each) 3 Q.H.
12.274, 12.275, 12.276 Undergraduate Research (each) 4 Q.H.
Original experimental work under the direction of a staff member. Participation may begin in the middler year and will normally continue through the senior year. Approval of the administrating committee is required.
Staff All Qtrs.
- 12.284 Advanced Chemical Synthesis** (Prereq. 12.155) 3 Q.H.*
Special projects in the synthesis of organic and/or inorganic compounds, using advanced techniques.
Prof. Viola All Qtrs.
- 12.286 Advanced Chemical Measurements** (Prereq. 12.163 and 12.179) 3 Q.H.*
Laboratory problems in analytical and/or physical chemistry.
Prof. Viola All Qtrs.
- 12.288 Special Topics** (Prereq. 12.163) 4 Q.H.
Staff Spring Qtr.
- 12.291, 12.292, 12.293, 12.294 Honors Program** (each) 4 Q.H.
All Qtrs.

Earth Sciences

- 16.104 Introduction to Earth Science** 4 Q.H.
Considers both the lithosphere and hydrosphere of the earth. The forces and factors

producing changes in these environments are examined in some detail and are applied to an understanding of the earth's historical development.

Staff

Fall and Winter Qtrs.

16.105 Introduction to Earth Science

(Prereq. 16.104) 4 Q.H.

A continuation of 16.104. Consideration of the gaseous envelope surrounding the earth and the meteorological phenomena occurring within it is followed by a study of the earth as an astronomical body. Particular emphasis is placed on the behavior of the earth as a member of the solar system.

Staff

Winter and Spring Qtrs.

16.109 Environmental Geosciences I

4 Q.H.

Emphasis placed on applying man's understanding of relevant earth processes to both making decisions and evaluating the decisions made by others (i.e., neighbors, industry, and governments). Topics include: earthquakes—control and prediction; the earth as a source of energy and other materials; groundwater—needs and pollution; disposal of wastes in the earth.

Prof. Bailey

Fall and Winter Qtrs.

16.110 Environmental Geosciences II

4 Q.H.

An approach similar to Environmental Geosciences I but with an emphasis on atmospheric components and systems interacting with man. Specifically treated are such problems as population growth and compaction as well as weather control, climatic modification, and pollution hazards.

Prof. Allen and Mr. Novak

Winter and Spring Qtrs.

16.121 Natural History I

4 Q.H.*

A framework is developed for investigating the factors of the natural world. Concepts of ecology are employed to examine the niche, habitat, biome, and realm. Content centers about the current season and the season to follow. Laboratory is structured to develop comprehension of and facility with the course materials and their adaptation to the educational process.

Prof. Wilmarth

Fall and Winter Qtrs.

16.122 Natural History II

(Prereq. 16.121) 4 Q.H.*

A continuation of Natural History I. Content is concerned with the remainder of the calendar year. Greater emphasis is placed upon dealing with the natural world by direct confrontation through field trips. Field exercises and personal research.

Prof. Wilmarth

Spring and Summer Qtrs.

16.125 Environmental Conservation

4 Q.H.

Problems relating to the use and preservation of the earth's environment. Both renewable and non-renewable resources will be considered, with special emphasis given to urban environmental problems.

Profs. Overcash and Ruggles

All Qtrs.

16.130 Marine Resources

4 Q.H.

A qualitative and quantitative survey of renewable and non-renewable resources from the sea. Aspects covered include: offshore oil and gas utilization, marine minerals, and tidal power; coastal zone recreational resources, including aspects of polluted beaches and artificial fishing reefs.

Prof. Gordon

Fall and Spring Qtrs.

16.131 Oceanography I

4 Q.H.*

The geology of the ocean basins; the physical and chemical properties of sea water; the development of ocean currents and their important effects on the land masses of the world.

Prof. Gordon

Fall, Winter, and Spring Qtrs.

16.132 Oceanography II

4 Q.H.*

The productivity of animal and plant life in the various zones of the ocean; the growing

*Including lab.

economic importance of the oceans as a source of food for the expanding world population.
 Prof. Gordon Fall, Winter, and Spring Qtrs.

16.133 Geology of Eastern United States 4 Q.H.

The systematic study of the geomorphic provinces in the Appalachian and interior regions of the United States. Emphasis on the structure, types of landforms, and geologic history of each province.

Prof. Ruggles Fall and Winter Qtrs.

16.134 Geology of Western United States 4 Q.H.

The systematic study of the geomorphic provinces in the Rocky Mountains and Pacific Coast Ranges of the United States. Emphasis on the structure, types of landforms, and geologic history of each province.

Prof. Ruggles Spring and Summer Qtrs.

16.140 Astrogeology 4 Q.H.

An examination of the geologic features of the moon and the planets, in the light of recent space explorations and current geologic theory. Evaluation of their evolution from a geologic perspective.

Prof. Prager Spring Qtr.

16.161 Observational Astronomy 4 Q.H.

Introduction to the night sky by confrontation technique. Identification of the permanency of the circumpolar region. A systematic analysis of the available hour angle constellations. Relevant supportive data provided for each nightly viewing. Continuous records of the characteristic behavior of the sun, moon and available naked-eye planets. Periodic out-of-doors viewing sessions with binoculars and telescopes (amateur quality) especially on occasions of special phenomena, i.e., meteor showers and comets. Explanatory instructional information during open portions of class periods by lecture, lecture-demonstration, or planetary sessions.

Prof. Wilmarth All Qtrs.

16.165 Principles of Planetary Science 4 Q.H.

Ancient concepts of the "Universe" derived from naked-eye observations; the evolutionary development of the Ptolemaic Universe and its final defeat by developments ranging from Copernicus to Newton. Detailed studies of the characteristic physical-chemical features and behaviors of the individual components of the Solar System. Non-Copernican phenomena: meteors, meteor showers, aurora, etc.; the recent contributions of the NASA programs to our understanding of our earth.

Profs. Wilmarth and Prager All Qtrs.

16.171 Human Geography 4 Q.H.

Geographic principles in the spatial structure and organization of society. Included will be analyses of land uses, settlement patterns, population flows, communication networks, transportation patterns, and locational decisions.

Mr. Novak Fall Qtr.

16.172 Population Geography 4 Q.H.

Geographic appraisal of world population. Introduction to historical trends of population growth, present world-wide population distributions, and migration patterns. Topics include: analysis of population characteristics, man-land ratios, under- and over-populated countries and regions, and estimates of future population growth.

Mr. Novak Spring Qtr.

16.176 World Geography I 4 Q.H.

The earth's varied "cultural landscape" as an expression of the interaction between man and the physical environment. After an introduction to general cultural, spatial, and environmental concepts, the course will survey the regions of Anglo-America and Europe.

Mr. Casarjian and Mr. Novak Fall and Spring Qtrs.

16.177 World Geography II

4 Q.H.

The "cultural landscape" of Latin America, Africa, Asia, and the Pacific Basin.

Mr. Casarjian and Mr. Novak

Winter and Spring Qtrs.

16.180 Physical Geography I

4 Q.H.

Constructed to promote an understanding of man's physical environment, with concentration of study upon weather, climate, and vegetation on a world-wide scale.

Prof. Allen, Mr. Casarjian, and Mr. Novak

Fall and Winter Qtrs.

16.182 Physical Geography II

(Prereq. 16.180) 4 Q.H.

An interpretative description and analysis of landforms and soils. Emphasis on an examination of landform development and distribution.

Prof. Allen, Mr. Casarjian, and Mr. Novak

Winter and Spring Qtrs.

16.183 Regional Geography of Africa

4 Q.H.

Regional analysis of historical, economic, political, cultural, and physical aspects of geography. A comparative case study approach is utilized in order to accent regional differences.

Mr. Casarjian

Fall Qtr.

16.184 Regional Geography of Latin America

4 Q.H.

Regional analysis of historical, economic, political, cultural, and physical aspects of geography. Population geography is also examined. Problems in tropical development are studied by means of a comparative case study approach.

Mr. Casarjian

Winter Qtr.

16.186 Applied Climatology

(Prereq. 16.180) 4 Q.H.

The individual elements of climate are synthesized into climatic types and regions. Climatic classifications are employed as vehicles for describing the distribution of climates. Microclimatology and applied climatology and human dimensions of weather modification are introduced.

Mr. Casarjian

Winter Qtr.

16.187 Urban Geography

4 Q.H.

Geographic structures and functions of individual cities are elaborated and the factors which determine those structures studied. Theory of city systems is developed in detail and the modern megalopolitan forms explained. Processes and problems of city growth are investigated and an attempt made to consolidate the variety of explanations for them.

Prof. Allen

Spring Qtr.

16.188 Economic Geography

4 Q.H.

The underlying principles governing the spatial distribution of economic activities. The principles of comparative advantage, transportation costs, scale and agglomeration economics as well as current location theories will be discussed.

Prof. Allen

Winter Qtr.

16.191 Meteorology

4 Q.H.

Physical factors and processes in the atmosphere which cause weather. Examples used to illustrate general concepts will be drawn from the New England region.

Mr. Casarjian

Fall Qtr.

16.195 Geography of Soils

4 Q.H.

Factors and processes important to soil development. An analysis of the physical and chemical characteristics of the great soil groups and their worldwide distribution.

Mr. Casarjian

Spring Qtr.

16.201 Physical Geology

4 Q.H.

A systematic study of the materials comprising the earth. Topics emphasized include the processes by which rock is formed, transported, altered, and destroyed, as well as the nature and development of landscape.

Staff

Fall and Winter Qtrs.

16.202 Historical Geology

(Prereq. 16.201) 4 Q.H.*

The physical and biological history of the earth is traced through geologic time. Major topics are the origin and evolution of life, mountain building, and continental drift.

Prof. Bailey and Newman

Winter and Spring Qtrs.

16.203 Physical Geology Laboratory

(Prereq. 16.201 or concurrently) 1 Q.H.*

Optional laboratory for Physical Geology 16.201. Laboratory exercises pertain to mineral and rock identification and topographic and geologic map interpretation. Required for Geology majors.

Staff

Fall and Winter Qtrs.

16.204 Historical Geology Laboratory

(Prereq. 16.202 or concurrently) 1 Q.H.*

Fossil representatives of major invertebrate phyla; application of fossils to studies of rock sequences; and interpretation of geologic history from geologic maps.

Prof. Bailey

Winter and Spring Qtrs.

16.205 Regional Geology of North America

(Prereq. 16.201, 16.202) 4 Q.H.

The evolution of the North American continent through geologic time. Emphasis is placed on selected regions which illustrate principles of continental evolution or significant stages in that evolution. Included among the selected regions are the Canadian Shield, the Interior Lowlands, the Appalachian Mountains and related systems, and the mountain belts of western North America.

Prof. Newman

Fall and Spring Qtrs.

16.211 Descriptive Mineralogy

(Prereq. One year of chemistry) 4 Q.H.*

Study of mineralogy, including crystallography, and physical, chemical, and descriptive mineralogy of the common rock-forming minerals.

Prof. Westerman and Prager

Fall and Winter Qtrs.

16.212 Optical Crystallography

(Prereq. 16.211) 4 Q.H.*

Both the theory and the practical methods of optical crystallography are studied, including the basic techniques for determining the optical constants of crystals using the polarizing microscope and immersion media.

Prof. Westerman and Prager

Spring and Summer Qtrs.

16.213 Optical Mineralogy

(Prereq. 16.212) 4 Q.H.*

The identification of the common rock-forming minerals using the petrographic microscope and rock-thin sections, including an introduction to mineral phase relationships.

Prof. Westerman

Fall and Winter Qtrs.

16.214 Geochemistry

(Prereq. One year of chemistry) 4 Q.H.

An evaluation of chemical processes important in the various geologic environments, and their effects on the development of the lithosphere.

Prof. Prager

Fall Qtr.

16.216 Igneous and Metamorphic Petrology

(Prereq. 16.213) 4 Q.H.*

The evolution of crystalline rocks and their distribution in time and space, including the physical and chemical factors in igneous and metamorphic processes.

Prof. Westerman

Spring Qtr.

16.221 Stratigraphy and Sedimentation

(Prereq. 16.202) 4 Q.H.*

The lithologic properties and stratigraphic relationships of sedimentary rock. Sedimentary processes, facies, and provinces of deposition are considered in conjunction with the collecting and evaluating of stratigraphic data. Classic stratigraphic sequences are reviewed, with emphasis on the general stratigraphic principles which they illustrate.

Prof. Bailey

Spring Qtr.

16.222 Sedimentary Petrology

(Prereq. 16.212) 4 Q.H.*

The origin, classification, petrography, and environment of deposition of all important types of sedimentary rocks. Laboratory work is concerned with the study and interpretation of sedimentary rocks in thin section.

Prof. Bailey

Fall Qtr.

16.231 Glacial and Pleistocene Geology

(Prereq. 16.202) 4 Q.H.

The processes of ice movement and the characteristics and distribution of erosional and depositional structures which are associated with past and present glaciers. Introduction to Pleistocene chronology and correlations.

Prof. Newman

Spring Qtr.

16.232 Geomorphology

(Prereq. 16.201) 4 Q.H.

The origin and evolution of landscape features by processes operating at or near the earth's surface.

Prof. Allen

Fall Qtr.

16.233 Coastal Processes

(Prereq. 16.201) 4 Q.H.

The effect of nearshore marine processes and the resultant coastal responses. The dynamics of waves and currents and the associated erosion, transportation, and deposition of sediment forming beaches, barrier islands, and cliffed structures.

Prof. Allen

Spring Qtr., odd-numbered yrs.

16.234 Fluvial Processes

(Prereq. 16.201) 4 Q.H.

A study of streams: their hydraulics, erosion, transportation, and deposition of sediment, channel shape and pattern, and drainage basin analysis.

Prof. Allen

Spring Qtr., even-numbered yrs.

16.235 Landform Interpretation

4 Q.H.

The origin and evolution of landscapes which may be interpreted on the basis of the size, shape, orientation, composition, and distribution of topographic features. Particular attention is given to the effects of different climates on landscape evolution. The use of topographic maps, geologic maps, and stereo-aerial photographs is emphasized.

Prof. Newman

Winter Qtr.

16.241 Structural Geology

(Prereq. 16.201) 4 Q.H.*

The fundamentals of rock structure and the mechanics of rock deformation. Folds, faults, joints, and cleavage, and their importance in geological interpretation. Analysis of structures in the field. Laboratory work consists of three-dimensional problems involving structural concepts.

To be announced

Winter Qtr.

16.243 Regional Tectonics

(Prereq. 16.201, 16.202) 4 Q.H.

Structural features and orogeny within the framework of major tectonic belts, and the evolution of these belts through geologic history.

Prof. Prager

Winter Qtr.

16.245 Economic Geology

(Prereq. 16.211 or Dept. approval) 4 Q.H.

The genesis, associations, and occurrence of the major ore minerals, illustrated by studies of selected ore bodies of various types throughout the world.

Prof. Prager

Spring Qtr.

16.246 Field Geology

(Prereq. 16.201) 4 Q.H.*

Field techniques as a working guide for the approach, pursuit, and solution of geologic problems. Among the techniques considered are geologic map construction, stratigraphic section measurement, and field rock description. The laboratory consists of field research at a quarry, roadcut, or other geologic exposure.

Profs. Prager and Westerman

Summer Qtr.

16.261 Advanced General Geology

(Prereq. 16.201, 16.202) 4 Q.H.

An introduction to new and advanced concepts, theories, and hypotheses in geology. Students participate actively in discussions, research papers, and individual projects. Topics may include: continental drift, sea floor spreading, uniformitarianism, peneplanation, evolution, origin of magma, and origin and geologic history of the moon.

Profs. Bailey and Newman

Summer Qtr.

*Including lab.

16.271 Geology Seminar

(Prereq. Major in Geology or senior status) 4 Q.H.

An in-depth study, on an individual or small-group basis, of a selected geologic topic. Both oral and written presentations are required.

Staff

Spring Qtr.

16.281, 16.282, 16.283, 16.284 Field Trip

(Prereq. 16.141) (each) 1 Q.H.

A three- to six-day field trip in eastern North America, providing exposure to various rock types, geologic structures, and fossil collecting. Field notes and summary report required of all participants; additional fee of \$5 to \$50 charged.

Staff

Fall and Spring Qtrs.

16.287, 16.288 Undergraduate Research

(each) 4 Q.H.

Independent research on a selected topic under the direct supervision of a faculty member. Open only to juniors and seniors majoring in Geology, with the recommendation of the supervising faculty member and the department.

Staff

All Qtrs.

16.290, 16.291 Directed Study

(each) 4 Q.H.

Independent study of a specific topic not normally contained in the regular course offerings, but within the area of competence of a faculty member. Open to all students with the recommendation of a faculty member and departmental approval.

Staff

All Qtrs.

16.295, 16.296, 16.297, 16.298 Honors Program

(each) 4 Q.H.

Staff

All Qtrs.

Biology

18.114 Functional Human Anatomy I

5 Q.H.*

Cellular and tissue structure and function, followed by anatomical terminology. Histology, anatomy, and physiology of bones, muscles, blood. Hemodynamics and principles of circulation. The laboratory includes a study of human bones, cat dissection, and related histology.

Fall and Winter Qtrs.

18.115 Functional Human Anatomy II

(Prereq. 18.114) 5 Q.H.*

Anatomy and physiology of the respiratory, digestive, urogenital, and nervous systems. Physiology of endocrine system and a brief anatomy and physiology of eye and ear. The laboratory includes studies of muscle and nerve physiology, blood physiology and histology, and physiology of respiration.

Winter, Spring, and Summer Qtrs.

18.117 Human Biology

3 Q.H.*

General biological principles applied to and illustrated by the human species; human cellular structure and basic metabolic processes; human genetics, human reproduction, human evolution, human ecology and interactions with other species of plants and animals.

Winter Qtr.

18.118 Organic Evolution

4 Q.H.

The major features of organic evolution, with emphasis on vertebrate evolution, genetics, and physical influences.

Staff

Spring and Summer Qtrs.

18.119 Environment and Man

4 Q.H.

An ecological analysis of the human situation and of man's interaction with other organisms. The necessary foundation of biological principles will be presented.

Staff

Fall and Winter Qtrs.

18.121 Introductory Microbiology

3 Q.H.

Survey of microbial life, emphasizing morphology, physiology, and the role in infectious disease of diverse microorganisms.

Staff

Fall, Winter, and Spring Qtrs.

*Including lab.

18.120 Basic Microbiology

4 Q.H.*

Microbial life, emphasizing morphological characteristics, physiological activities, and disease production.

Staff

Fall, Winter, and Spring Qtrs.

18.123 Biology of Human Reproduction

4 Q.H.

Structure and function of male and female reproductive systems; factors affecting sexual development, fertility, and reproductive behavior in the human species. Physiology of coitus, fertilization, pregnancy, birth, and lactation. Methods of controlling fertility; some consideration of eugenics and the world population problem.

Prof. Lambert

Winter Qtr.

18.124 Introductory Seminar in Biology

(Concurrently with 18.131) 1 Q.H.

Seminar designed to enrich the freshman Biology major's program by in-depth readings in a specific area of biology and small group discussions with a faculty member interested in that area. Limited to and required of freshmen who plan to major in Biology.

Fall and Winter Qtrs.

18.125 Human Physiology

(Prereq. 18.141, 18.142 or equiv.) 3 Q.H.*

Physical and biochemical activities of blood corpuscles, nerve and muscle fibers; functions of the nervous system, heart, and endocrines.

Fall and Winter Qtrs.

18.126 Human Physiology

(Prereq. 18.125) 3 Q.H.*

Respiration and circulation; functions of the blood, lymph, kidneys; nutrition and digestion; sensory physiology and physiologic aspects of reproduction.

Spring and Summer Qtrs.

18.131 General Biology

4 Q.H.*

Universal properties and processes of living organisms. Cellular composition and cellular activities, inheritance and cellular control, the evolutionary process environmental relationships.

Profs. Werntz and Ruber

Fall and Winter Qtrs.

18.132 Animal Biology

(Prereq. 18.131) 4 Q.H.*

Systematic comparative study of the structure and functions of animals. Diversity of animals considered from the standpoint of evolutionary adaptation.

Staff

Winter, Spring, and Summer Qtrs.

18.133 Plant Biology

(Prereq. 18.131-18.132) 4 Q.H.*

Systematic study of the structure and function of plants, principally vascular. Survey of the plant-like protists and monorans.

Prof. Levering

Fall and Winter Qtrs.

18.134 Environmental and Population Biology

(Prereq. 18.131-18.133) 4 Q.H.*

Detailed consideration of the physico-chemical factors influencing and influenced by organisms. Interactions among individual organisms and among species. Change of species by genetic natural selection.

Profs. Ruber and Levering

Spring and Summer Qtrs.

18.135 Genetics and Development Biology

(Prereq. 18.131-18.133) 4 Q.H.*

Elaboration of the classic laws of heredity. Cytogenetics. Chemical basis of heredity. Selected examples of the development of form and function.

Prof. Ellis

Fall and Winter Qtrs.

18.136 Cell Biology

(Prereq. 18.131-18.133; 12.171) 4 Q.H.

Basic chemical and physical processes of cells related to their fine structure; oxidative and intermediary metabolism; photosynthesis, membrane phenomena; movement; chemical and physical processes of prokaryotic and eukaryotic cells.

Profs. Gainor and Lambert

Spring and Summer Qtrs.

18.141 Basic Animal Biology

4 Q.H.*

Principles of biology. Universal properties and processes of living organisms as exemplified

by the cell and its activities. Inheritance, evolution, and environmental relationships.

Profs. Werntz and Ruber

Fall and Winter Qtrs.

18.142 Basic Animal Biology

(Prereq. 18.141) 4 Q.H.*

Structure and function of organ systems and animals. Diversity of animals considered from the evolutionary standpoint.

Staff

Winter, Spring, and Summer Qtrs.

18.145 Human Anatomy and Physiology I

4 Q.H.*

Lecture—structure of the human organ systems. Physiology of muscle and of the nervous system; control of voluntary movement, autonomic control, sensation. Laboratory—anatomy, based on dissections of a representative mammal and comparison with human models; microscopic anatomy of selected organs.

Winter Qtr.

18.146 Human Physiology II

(Prereq. 18.145) 4 Q.H.*

Lecture—human physiology based on the concept of the homeostatic state; functions of the blood and circulatory system, immunity, digestion, nutrition, respiration, excretion, reproduction, endocrine controls of the preceding processes. Laboratory—experiments demonstrating selected physiological phenomena in humans or in representative animals.

Spring Qtr.

18.148 Human Anatomy

4 Q.H.*

The structure and development of the human body.

Spring and Summer Qtrs.

18.158 Vertebrate Physiology

(Prereq. 18.131-18.133, 18.136) 4 Q.H.*

Properties of living protoplasm; the general organization and function of cells; translocation of materials and the organization of animals; the physiology of the skeletal systems of man and animals; the physiology of amoeboid, ciliary and contractile movement with emphasis on muscle metabolism; the structure and function of neurons, reflex arcs, the autonomic nervous system, and the sensory receptors.

Prof. Pearincott

Fall and Winter Qtrs.

18.159 Vertebrate Physiology

(Prereq. 18.158) 4 Q.H.*

Fluid media of animals, emphasizing water and electrolyte balance and kidney function in man; the physiology of blood, including its formation, functions, clotting, antigens and tests for identifying blood; the physiology of the heart, nervous control of the vascular system, breathing and gas transport, heat regulation, nutrition, digestion and assimilation; the endocrine secretions, and the physiologic aspects of reproduction.

Prof. Pearincott

Spring and Summer Qtrs.

18.208 Comparative Vertebrate Anatomy

(Prereq. 18.131 and 18.132) 5 Q.H.*

Morphology and phylogeny of the vertebrates; laboratory studies on taxonomy of the group and specific morphology of the dogfish shark, the mud puppy, the alligator and the cat.

Spring and Summer Qtrs.

18.209 Embryology

(Prereq. 18.131, 18.132, 18.135) 5 Q.H.*

Gametogenesis, fertilization, cleavage, gastrulation, induction, organogenesis, and metamorphosis in vertebrates. Emphasis on frog, chick, and pig in the laboratory.

Fall Qtr.

18.210 Invertebrate Zoology

(Prereq. 18.131-18.135) 5 Q.H.*

The invertebrate animals exclusive of the protozoans and insects.

Prof. Morse

Fall and Winter Qtrs.

18.211 Parasitology

(Prereq. 18.131, 18.136) 4 Q.H.*

Symbiotic relationships of protozoans, mesozoans, flatworms, nematodes, acanthocephalans, and arthropods.

Prof. Meszoely

Fall and Winter Qtrs.

18.212 Vertebrate Paleontology

(Prereq. 18.131, 18.132, 18.134, 18.135 or permission of the instructor) 4 Q.H.*

Evolution of the vertebrates, including man, as revealed through the fossil record. Laboratory, museum, and field studies.

Spring Qtr.

18.214 Current Topics in Parasitology

(Prereq. 18.211) 3 Q.H.

Recent developments in parasitology including host-parasite relationship, zoonosis, biochemistry and cell biology. Classical experiments will also be discussed.

Prof. Strauss

Fall Qtr.

18.215 Advanced Parasitology Laboratory

(Prereq. 18.214 or concurrently) 1 Q.H.

Physiology of the parasite and the host-parasite relationships. Each year different parasites will be chosen for culture and experimentation. The nature of the laboratory will depend on the choice of parasites.

Prof. Strauss

Fall Qtr.

18.220 General Microbiology

(Prereq. or Coreq. 12.145, 18.135, 18.136 or permission of the instructor) 5 Q.H.*

Basic detailed structure and function of microorganisms and their interaction with their environments based on current knowledge and theory.

Prof. Rosenberg

Fall, Winter, and Spring Qtrs.

18.227 Animal Histology

(Prereq. 18.132) 4 Q.H.*

Microscopic study of fundamental types of animal tissues.

Prof. Pearincott

Fall Qtr.

18.228 Histological Technique

(Prereq. 18.131, 18.136) 3 Q.H.*

General methods of tissue preparation for purposes of microscopic study; preparation of solutions and stains; the microtome and its operation, together with specific directions for fixation, clearing, hardening, embedding, section-cutting, and staining of tissues.

Prof. Morse

Spring Qtr.

18.231 Lower Plants

(Prereq. 18.133) 4 Q.H.*

Systematic morphology and life cycles of monera and plant-like protista.

Fall Qtr.

18.232 Higher Plants

(Prereq. 18.133) 4 Q.H.*

Systematic morphology of the metaphyla.

Winter Qtr.

18.233 Systematic Botany

(Prereq. 18.133) 4 Q.H.*

Spring Qtr.

18.234 Plant Anatomy

(Prereq. 18.133) 4 Q.H.*

Comparative developmental anatomy of seed plants.

Spring Qtr.

18.235 Economic Botany

(Prereq. 18.133) 4 Q.H.*

Structure, distribution, and cultivation of economic plants, food, and medicinal plants, including those producing fibers, sugars, starches, rubber, gums, spices, and beverages.

Prof. Khudairi

Winter and Summer Qtrs.

18.236 Horticulture

(Prereq. 18.133 or equiv.) 4 Q.H.*

Basic cultivation methods for ornamental and food plants. Offered at the University Greenhouse.

Spring Qtr.

18.237 Introduction to Plant Physiology

(Prereq. 18.133) 5 Q.H.*

Physiological processes in plants at the cellular and organ levels including water relations, mineral nutrition, photosynthesis, respiration, protein and fat synthesis, growth, plant hormones, and development.

Prof. Khudairi

Fall Qtr.

18.238 Local Flora

(Prereq. 18.133) 4 Q.H.

Local vascular flora (ferns, gymnosperms, and angiosperms) is examined with emphasis on recognition and appreciation of plant family characteristics. Preparation of herbarium specimens is presented. Field trip attendance is required.

Prof. Levering

Summer Qtr.

18.239 Terrestrial Ecosystems of North America

(Prereq. 18.133 or permission of instructor) 4 Q.H.*

The major ecosystems of North America are examined with emphasis on species diversity, productivity, origin, history, and geographical location. Primary emphasis is placed upon vegetation. Field trips are required and will be arranged with students after the first class meeting.

Prof. Levering

Spring Qtr.

18.240 Microbial Physiology

(Prereq. 18.220 or equiv.) 4 Q.H.*

The biochemical changes brought about through microbial activities; measurement of metabolic biosynthesis and degradation, rates of reaction and determination of end products.

Prof. Rosenberg

Fall and Winter Qtrs.

18.242 Medical Microbiology

(Prereq. 18.220 or equiv.) 4 Q.H.*

The bacterial cell as a pathogen, stressing major genera of disease-producing organisms and factors influencing virulence.

Prof. Gabliks

Winter and Spring Qtrs.

18.245 Serology—Immunology

(Prereq. 18.220 or equiv.) 3 Q.H.

Current concepts concerning specific and nonspecific factors of resistance to microbial disease. Chemical and biological considerations of antigens and antibodies.

Prof. Gainor

Winter Qtr.

18.246 Serology—Immunology Laboratory

(Prereq. or Coreq. 18.245) 2 Q.H.*

Laboratory studies of procedures employed in biological research. Antibodies will be produced and qualitative and quantitative approaches to agglutination, precipitin, agar diffusion, and other tests will be studied.

Prof. Gainor

Winter Qtr.

18.251 Comparative Animal Physiology

(Prereq. 18.132, 18.136 or equivs.) 4 Q.H.*

Study of animal functions, their control, and their adaptiveness to various environments. Consideration of phylogeny of these adaptations and of their underlying cellular mechanisms. Emphasis on invertebrates and lower vertebrates, with comparisons to mammals.

Prof. Werntz

Winter Qtr.

18.280 Senior Seminar

(Prereq. Completion of core biology program, 18.131-18.136) 1 Q.H.

Recent developments in various topics of zoology, microbiology, physiology, botany, ecology, genetics, and cell biology. Student presentation and analysis is emphasized. Limited to qualified juniors and seniors in the B.A. program and required of seniors in the B.S. program.

Fall, Winter, and Spring Qtrs.

18.290, 18.291 Directed Study

(Prereq. Completion of core biology program, 18.131-18.136) (each) 2 Q.H.

Independent work on a chosen topic under the direction of members of the Department. Limited to qualified juniors and seniors with approval of the Department and special arrangements with the supervising faculty member. The two quarters of this course together are counted as one elective course in the Biology Department.

Staff

All Qtrs.

18.295, 18.296, 18.297, 18.298 Honors Program

(each) 4 Q.H.

All Qtrs.

*Including lab.

Psychology

The rapid expansion in the number of psychology course offerings, planned to meet the needs and interests of an increased student group, results in the listing of new courses in this catalog (denoted **N**) which will be given during the 1974-75 academic years. For specific scheduling information, students should request a current course listing at the Psychology Department Main Office, 440 UR.

Students should note that course numbers below are sometimes presented out of numerical sequence, to reflect subject areas and levels of study most clearly.

INTRODUCTORY COURSES (Liberal Arts curriculum)

19.105 Foundations of Psychology I

4 Q.H.

The basic principles of psychological analysis are taught by a personalized interactive method, using videotapes, progress quizzes, one-to-one study tutorials, and optional small-group discussions. The student can study at his/her own pace, within flexible calendar limits, and class hours are not preassigned.

All Qtrs.

19.106 Foundations of Psychology II

(Prereq. 19.105) 4 Q.H.

The personalized method of 19.105 is extended, featuring a sequence of graded reading assignments and tutorial sessions, with frequent self-evaluation of study progress. Topics include: the analysis of behavior as applied to education, personality and behavior disorders, brain damage and language, sensory processes, ethology and aggression.

All Qtrs.

QUANTITATIVE METHODS

19.120 Statistics in Psychology I

(Prereq. 19.105) 4 Q.H.

A "self-paced" course in the manner of 19.106, Stat. I features a tutorial system that encourages the most advanced students to join in the teaching process by working as "peer-tutors" with the rest of the class. Students achieve a mastery of basic descriptive statistical measures. A sequence of carefully constructed work-problems is supplemented by progress checks, tutorials, and small-group review sessions.

19.121 Statistics in Psychology II

(Prereq. 19.120) 4 Q.H.

Students achieve mastery of the techniques for evaluating statistical data and the conclusions drawn from such data. Course format follows 19.120.

All Qtrs.

19.125 Quantitative Methods

(Prereq. 19.121, math elective) 4 Q.H.

Students achieve proficiency in using quantitative tools to solve problems in different areas of psychology. Topics include: graphical methods and logarithms, calculators and slide rules, flow charting, key punching, computer programming in FORTRAN, FOCAL and PAL languages, and simplified discussions of information theory, Fourier analysis, signal detection theory, matrix notation, and computer simulations of psychological systems.

19.126 Advanced Quantitative Methods Seminar

(Prereq. 19.125) 4 Q.H.

This seminar is concerned with the rationale that lies behind psychological measurements, and with the derivation of mathematical models that are used to interpret and validate these measurements. **N.**

LEARNING, BEHAVIOR ANALYSIS, BEHAVIOR MODIFICATION

19.160 Research Methods in Psychology

(Prereq. 19.106, 19.120) 4 Q.H.

Concentration upon the experimental method in the design, execution, analysis, and reporting of psychological investigations. Includes laboratory experiments with human and animal subjects.

19.164 Learning and Motivation

(Prereq. 19.106, 19.120) 4 Q.H.

This course features the application of basic behavioral principles to behavioral develop-

ment, behavior modification, language development, and programmed learning, and their relations to theoretical considerations in the learning process. **N.**

19.165 Learning Laboratory

(Prereq. 19.160 or 19.164) 4 Q.H.

Through direct experience, students gain proficiency in the laboratory analysis of behavior, and in evaluating common generalizations about human behavior. Students design and perform experiments in animal and human learning, memory, decision processes, concept formation, and other topics of individual interest. **N.**

19.166 Programmed Learning

(Prereq. 19.161 or 19.164) 4 Q.H.

The development of programmed instruction has been one of the products of basic behavioral research. Students learn to evaluate instructional programs in the light of basic behavioral principles, and become acquainted with programming techniques in the normal classroom, special education classroom, in complex academic subject matter, and in individual problem areas. **N.**

19.167 Applied Programmed Instruction

(Prereq. 19.166) 4 Q.H.

Students design, test, and evaluate instructional programs for teaching specific subject matter material, or for application to remedial problems, and to test basic instructional theory. **N.**

19.168 Behavior Changed in Institutions

(Prereq. 19.161 or 19.164) 4 Q.H.

A review of successful projects which have been carried out to provide effective remediation and rehabilitation in institutions for the mentally ill, the mentally retarded, the juvenile delinquent (prisons) and the developing human (schools). **N.**

19.169 Punishment and Anxiety

(Prereq. 19.161 or 19.164) 4 Q.H.

How do coercion and aversive consequences influence the course of individual behavior and social interaction? The experimental evidence is surveyed, including an examination of avoidance behavior, escape behavior, and the development of anxiety, as they occur under conditions of coercion. **N.**

19.170 Abnormalities of Language

(Prereq. 19.161 or 19.164) 4 Q.H.

The behavioral analysis of aphasia, stuttering, and reading problems. **N.**

19.171 Applied Behavior Modification I

(Prereq. 19.165, 19.166) 4 Q.H.

In field settings, students gain experience in applying the basic principles of behavior in situations where behavioral change is a desirable goal: remedying behavioral deficits and problem behavior in the retarded and mentally ill; the development of self-control by normal humans; the design of personalized instruction systems; the use of contingency contracting; and other problems of individual interest. **N.**

19.172 Applied Behavior Modification II

(Prereq. 19.171) 4 Q.H.

Continuation of 19.171. **N.**

SENSORY PSYCHOLOGY AND PERCEPTION

19.150 Perception

(Prereq. 19.106) 4 Q.H.

An introduction to the nature of the perceptual world; the nature of object recognition and identification, spatial organization, contextual effects, learning and perception, and the influence of attitudinal, motivational, and personality factors on perception. This course allows the student to self-pace his/her work, using a system of carefully structured work problems, supplemented by progress checks and tutorials.

19.153 Sensation

(Prereq. 19.150) 4 Q.H.

What and how we see, hear, feel, taste, and smell. Our perceptual world is studied in terms of loudness, brightness, color, flavors, etc., which can be specifically related to the functioning of our sensory nervous systems. **N.**

19.162 Sensation and Perception Laboratory I

(Prereq. 19.150) 4 Q.H.

Students do laboratory experiments on seeing, hearing, touching, and tasting. Studies may include dark adaptation, loudness, binaural interaction, brightness constancy, two-point touch thresholds, information processing and interactions between the senses.

19.173 Sensation and Perception Laboratory II

(Prereq. 19.162) 4 Q.H.

Students do laboratory experiments on visual and auditory perception. Studies may include: taste and smell, size and space perception, visual illusions, auditory localization, pattern recognition, pitch memory and left and right ear differences. **N.**

19.174 Vision Seminar

(Prereq. 19.162) 4 Q.H.

This seminar considers the current status of some of the classical problems of vision. Discussions are concerned with advanced problems of stimulus specification, retinal structure, photochemistry, and psychophysics. **N.**

19.175 Seminar on Auditory Perception

(Prereq. 19.162) 4 Q.H.

Dichotic listening, theories of pitch perception, critical bands, loudness functions, auditory pathology, single-unit measurements in the auditory nervous system, and other topics of interest serve as the basis for student-led discussions. **N.**

19.176 Seminar on the Tactual and Chemical Senses

(Prereq. 19.162) 4 Q.H.

Taste mixtures, olfactory adaptation, physiological basis of taste, tactual "speech," movement on the skin, subjective magnitude functions in taste and smell, and the stimulus for smell are the basis for seminar reports and discussions. **N.**

19.177 Seminar on Proprioception and Kinesthesia

(Prereq. 19.162) 4 Q.H.

Student-led discussions consider the sensory systems which serve the muscles, tendons, and joints, and the mechanisms by which they control integrated motor behavior. **N.**

19.190 Animal Psychophysics Laboratory

(Prereq. 19.162, 19.165) 4 Q.H.

A survey of behavioral techniques for investigating sensory and perceptual processes in lower animals. The use of animal subjects to study vision and hearing can provide new insights into the physiological and behavioral processes that underlie these important human functions. **N.**

19.191 Drugs and Perception Seminar

(Prereq. 19.150, 19.179) 4 Q.H.

Discussion centers on the changes in perceptual behavior which are produced by certain pharmacological agents and substances which act upon the sensory system. A critical examination is made of the experimental methods which are used to evaluate induced perceptual changes and the results which have been obtained. **N.**

19.192 Sensory and Perceptual Abnormalities

(Prereq. 19.150, 19.171) 4 Q.H.

A consideration of some of the peripheral factors which influence perception of the external world. Discussions consider how sensory deficits can influence behavior and some of the means for dealing with sensory and perceptual abnormalities. The application of programmed instruction to the development of sensory tests and remedial procedures for nonverbal people; blind or deaf retarded people, young children who have not yet learned to speak, and aphasic patients; the detection of hysterical sensory loss and malingering. **N.**

PHYSIOLOGICAL PSYCHOLOGY**19.178 Physiological Basis of Psychology I**

(Prereq. 19.106) 4 Q.H.

How nerves function and work together in the nervous system; how our sense organs provide the brain with information about the outside world; how the brain acts to produce externally observable behavior; and how such psychological concepts as perception, learning, motivation, arousal, and emotion may relate to nervous system activity.

19.179 Physiological Basis of Psychology II

(Prereq. 19.178) 4 Q.H.

Continuation of 19.178.

19.180 Seminar in Physiological Psychology

(Prereq. 19.179) 4 Q.H.

For students who desire an intensive discussion and practice of laboratory studies of physiological variables. Topics include: evolution of the nervous system, sensory and motor mechanisms, motivation and emotion, sleep, attention and perception, learning, and memory.

19.181 Practicum in Physiological Psychology

(Prereq. 19.180) 4 Q.H.

Laboratory experiments based on 19.180 discussion topics.

19.182 Arousal and Motivation Seminar

(Prereq. 19.179) 4 Q.H.

Examines the experimental methods used to evaluate the concepts of arousal, activation, task relevancy, and motivation. Discussion deals with the results obtained in studies of sleep and wakefulness, attention, and vigilance, when using the electroencephalogram, electromyogram, galvanic skin reflex, reaction time, and the electrocardiogram as response indicators. **N.**

19.183 Biological Bases of Motivation

(Prereq. 19.179) 4 Q.H.

Focuses on the mechanisms of eating and drinking behavior, attention, sleep, arousal, and emotional behavior. **N.**

19.184 Biological Bases of Learning and Memory

(Prereq. 19.179) 4 Q.H.

The capacity of organisms to learn and retain is analyzed as a function of the increasing complexity of brain structure and function at different phylogenetic levels. The course is concerned with the neural mechanisms underlying learning and the effects of brain damage on memory. **N.**

19.185 Physiological Basis of Abnormal Behavioral Development in Humans

(Prereq. 19.140, 19.179) 4 Q.H.

Interactions between human behavior and the central nervous system, with special emphasis on the role of abnormalities in illuminating normal processes of remembering and forgetting, speech, language, learning, and motor skills. **N.**

19.186 Comparative Psychology and Ethology

(Prereq. 19.179) 4 Q.H.

This course is concerned with the increasing complexity of behavior as we move from simple organisms to primates. Special attention is focused on experimental approach to instinctive, maternal, emotional, and problem-solving behavior. The constitutional vs. environmental factors in behavior are discussed in terms of phylogenetic development. **N.**

19.187 Sensory Physiology Seminar

(Prereq. 19.153, 19.179) 4 Q.H.

Concentrates on the psychophysiology of various sensory systems. Discussions are concerned with the problem of accounting for sensory phenomena in terms of physiological concepts. Particular attention is given to the senses of vision and hearing. **N.**

19.188 Sensory Physiology Laboratory (Prereq. 19.178, 19.150, biology elective) 4 Q.H.

Experiments are performed to illustrate the physiological techniques used in sensory psychology. Electrical recordings are made of some of the activities that accompany visual, auditory, and cutaneous activity. **N.**

19.189 Behavioral Pharmacology

(Prereq. 19.161, 19.179) 4 Q.H.

The application of quantitative behavior techniques in animals and man, to determine the behavioral effects of pharmacologic agents. A systematic survey of the experimental literature. **N.**

PERSONALITY, COGNITIVE, SOCIAL, AND DEVELOPMENTAL ASPECTS**19.130 Social Psychology**

(Prereq. 19.106) 4 Q.H.

Among the topics included are a survey of current social theories and models in terms of their relevance to Black culture and experience, historical development of social psychology, group membership and structure, leadership, and social movements.

19.135 Personality I

(Prereq. 19.106) 4 Q.H.

A systematic study of the normal personality, its growth and development. Topics include: environmental and constitutional contributions, assessment of personality, research, and a survey of the major theories of personality.

19.136 Personality II

(Prereq. 19.135) 4 Q.H.

Continuation of 19.135.

19.138 Experimental Personality

(Prereq. 19.161 or 19.164) 4 Q.H.

Introduction to methods and areas of research on personality. Includes problems of measurement, behavioral and dynamic concepts, and a laboratory project.

19.140 Normal and Abnormal Human Development (Prereq. 19.161 or 19.164) 4 Q.H.
The behavioral examination of developmental abnormalities—as evidenced in mental retardation, childhood schizophrenia, child delinquency, hyperactivity, specific learning problems, and aging—is used to illuminate normal developmental processes.

19.146 Motivation (Prereq. 19.106) 4 Q.H.
The various aspects of motivation, primary and secondary drives, unconscious motivation, effective motivation, the assessment of motives. This course is not designed for students majoring in Psychology, who cover this material in required advanced courses (see catalog section on Learning, Behavioral Analysis, and Behavior Modification).

19.155 Psychology of Language (Prereq. 19.106) 4 Q.H.
Topics include: the child's acquisition of language, verbal habits, the analysis and measurement of meaning, cultural determinants of linguistic behavior, communication processes, and recent research in psycholinguistics.

19.156 Psychology of Thought (Prereq. 19.155) 4 Q.H.
Psychological factors in problem solving, imagination, intuition, information processing, and concept learning.

19.157 Cognition and Human Learning (Prereq. 19.106) 4 Q.H.
A review of the verbal learning literature (studies dealing with paired-associate learning, serial learning, memory and attention) from a cognitive point of view. Higher-order mental processes, such as concept attainment, language development, probability learning. A consideration of mathematical models of human cognitive behavior.

19.202 Dynamic Psychology I (Prereq. 19.136, Middler standing) 4 Q.H.
Discussions of the abnormal personality, historical background, criteria of abnormality, theoretical framework of normal and abnormal development, anxiety and defense, etiology, dynamics, and symptomatology of the neuroses.

19.203 Dynamic Psychology II (Prereq. 19.202) 4 Q.H.
Survey of psychotherapeutic techniques; etiology, dynamics and symptomatology of the psychoses; psychosomatic, sociopathic and organic disorders in the context of personality problems.

GENERAL ISSUES FOR PSYCHOLOGISTS

19.210 Scientific Foundations of Psychology (Prereq. Junior Psych. major) 4 Q.H.
The evaluation of modern psychology in the light of its historical origins. This course is designed especially for Psychology majors who are preparing for graduate school admissions and/or civil service examinations, both of which emphasize familiarity with historical issues, the work of major contributors to psychology, and the methods, data and theoretical systems they developed. Students often find this course most useful when taken at the end of the junior year or start of the senior year, shortly before the relevant examinations are scheduled.

19.278 Ethical Problems of Psychology (Prereq. Senior Psych. major) 4 Q.H.
A seminar examining some moral and ethical controversies associated with modern psychologies theories and practices. What should be the goal of psychology? Is a commitment to scientific determinism consistent with humanistic goals? Is "mental illness" a myth? Are men controlled or basically free? Should psychologists attempt to control behavior and change attitudes? Is deception of experimental subjects justifiable? How can pseudoscientific psychological theories be distinguished from legitimate ones? Works to be discussed include those of Laing, Maslow, Sartre, Skinner, and Szasz.

19.279 Impact of Psychology on Society (Prereq. Senior Psych. major) 4 Q.H.
A seminar considering such recent developments as the uses of intelligence and aptitude tests, psychosurgery and electroconvulsive therapy, techniques of behavior modification and

control, direct brain stimulation by implanted electrodes, use of psychoactive drugs, use of lie detectors, and the application of experimental techniques to humans.

19.280 Senior Seminar (Prereq. Senior Psych. major) 4 Q.H.

Small groups of students meet to discuss topics in psychology of mutual interest. Each seminar has a different flavor, depending on the student group and faculty member participant. At the start of each year, faculty members scheduled for this course describe a range of prospective topics for discussion each quarter (in the Psychology Department's course pamphlet, available from secretaries in 440 UR), to assist students in selecting the most appropriate seminar for their interests.

19.281 Social Change Seminar (Prereq. 19.168) 4 Q.H.

The relevance of behavioral principles to the design of social communities, the role of coercion (e.g., police, prisons, military) in the social system, a discussion of constructive alternatives to coercion, the relevance of law to individual behavior, the role of science in society, and the role of the university in society.

SPECIAL EXPERIENCES IN PSYCHOLOGY

19.285-289 Teaching Practicum in Psychology (Prereq. Dept. approval) (each) 4 Q.H.

Students who have received the grade of A in PSI courses may serve as undergraduate peer-teachers in subsequent quarters of the course, under the guidance of each course instructor. Includes a seminar on teaching technology and tutorial methods, how to handle individual study problems, analysis of case studies, etc. An undergraduate may repeat this course for P-F elective credit (counting toward Psychology major requirements) by teaching in several PSI courses. Application for participation in each course is made by communicating with the appropriate instructor at least one month before the start of each quarter.

19.290-294 Directed Study (Prereq. Dept. approval) (each) 4 Q.H.

Independent work under the direction of members of the Department, usually in a research project in one of the Department laboratories. Faculty members usually require completion of advanced laboratory courses in the area of research interest, but this is a matter of individual discussion. If you are interested in Directed Study, but are unsure of whom to approach for potential sponsorship, schedule a chat with your adviser.

19.295-298 Honors Program (each) 4 Q.H.

For prerequisites and other details, see the section on Honors in this catalog.

SERVICE COURSES (NOT ELECTIVES; NOT FOR PSYCH. MAJOR CREDIT)

19.101 Introductory Psychology 3 Q.H.

A discussion of psychological principles for students with career interests in health sciences and professions. (Assigned curriculum.)

19.102 Basic Psychology 4 Q.H.

A discussion of psychological principles for students with career interests in health sciences and professions. (Assigned curriculum.)

19.141 Growth and Development I 4 Q.H.

Emphasis on infancy and childhood. Fundamental processes of growth and development from conception to the beginning of adolescence; physical development and maturation; socialization; social and interpersonal relations; intelligence, emotion, motivation and personality concepts. Emphasis upon family setting as well as upon broader social environment. (Assigned curriculum.)

19.142 Growth and Development II 4 Q.H.

Adolescence and adulthood. Exploration of physical and social changes in the years from adolescence to senescence. (Assigned curriculum.)

19.201 Psychology of Abnormal Behavior (Prereq. 19.140 or 19.141) 4 Q.H.

The symptomatology, etiology, dynamics, and therapy of the abnormal personality; the basic varieties of neurosis and psychosis; somatic therapies and fundamental varieties of psychotherapy. (Assigned curriculum.)

Anthropology

20.100 Principles of Social Anthropology

4 Q.H.

Basic principles.

Staff

All Qtrs.

20.130 Language and Culture

4 Q.H.

The function of language in human society and an introduction to the relationship between the patterns of language and the patterns of culture.

Prof. Bateson

Fall and Winter Qtrs.

20.135 Individual and Culture

4 Q.H.

An exploration of the ways in which the individual is shaped by his society and the ways in which he can effect change.

Staff

Spring Qtr.

20.140 Evolution and Society

4 Q.H.

Human social and cultural evolution, and the theories which account for it.

Staff

Fall and Winter Qtrs.

20.160 Anthropology of the Family

4 Q.H.

Western scientific and popular conceptions and misconceptions about the nature of the family and family interaction in our own culture, in other cultures, and among animals. Advice on how to run a family will NOT be given!

Staff

Fall and Winter Qtrs.

20.170 Culture in Transition

4 Q.H.

Analysis of the changing patterns in social, economic, and political institutions. Modern social trends are discussed.

Staff

Winter and Spring Qtrs.

20.210 Tribal Societies and Cultures

4 Q.H.

The structures and institutions of bands, tribes, and chiefdoms; comparative and functional studies of tribal societies and the dynamics of change under contact situations.

Staff

Spring Qtr.

20.214 Peasant Society and Culture

4 Q.H.

Institutions of peasant society. The structure of traditional civilizations and the interrelations between urban and local communities; comparative and functional analysis of the peasant community and the dynamics of change from peasant to post-peasant and industrialized societies.

Staff

Fall and Winter Qtrs.

20.220 Anthropology Methods

4 Q.H.*

Theory and practice of methods of field research and the analysis of data. Students take part in a field project.

Staff

Spring Qtr. alternate years.

20.230 Language and Communication

4 Q.H.

Human communication, including language, theories of the evolution of language; language and kinesics, semiotics, social class, linguistic nationalism; linguistic problems in modernization.

Prof. Bateson

20.240 Human Origins

4 Q.H.

An intensive look at the data on fossil remains and the data on contemporary primates which are essential for an understanding of human physical and behavioral evolution. Efforts are made to bring the student into direct contact with primary materials.

Prof. Leibowitz

*Including lab.

20.245 Cultural Ecology

4 Q.H.

An introduction to questions of human adaptation to environment and the effect of different adaptations on natural systems.

Staff

20.250 Political Anthropology

4 Q.H.

Origin and growth of the institutions of civilization. Specialization and social stratification in the dynamics of traditional civilizations; some special topics of contact and change.

Staff

20.255 Economic Anthropology

4 Q.H.

Types of economic systems in simple societies; reciprocal, redistributive, market exchange; economic relations as part of social relations; land tenure systems, credit systems, savings mechanisms. The transition from subsistence to cash economics.

Staff

20.257 Religion and Myth

4 Q.H.

Nature and institutionalization of primitive, ancient, and contemporary religions. Exploration of religious concepts and movements in relation to social, religious, and political organization.

Profs. Freilich and Bateson

20.259 Urban Anthropology

4 Q.H.

Selected problems in anthropological studies in urban societies.

Staff

20.260 Kinship and Society

4 Q.H.

This is a course for the advanced student only. A variety of kinship systems and their terminological and structural components, and the way in which their systems articulate with other social institutions.

20.270 Social Change and Economic Development

4 Q.H.

Selected studies of processes of transformation and modernization in non-industrial societies.

Staff

20.280, 20.281, 20.282, 20.283, 20.284, 20.285, etc.

(each) 4 Q.H.

Ethnographic area courses (New World Indian, Africa, India, Mediterranean, etc.) which will be offered as the Department's resources permit.

20.290-291 Directed Study

(Prereq. Department approval) 4 Q.H.

Independent work under the direction of members of the Department upon a chosen topic. Limited to qualified seniors preparing in anthropology with approval of the Department Chairman.

Staff

All Qtrs.

20.295, 296, 297, 298 Honors Program

(each) 4 Q.H.

All Qtrs.

20.801-802 Theory

Qualified undergraduates may wish to take this course which is offered in the graduate school. Permission of the instructor is required for registration.

Sociology

21.100 Introduction to Sociology

4 Q.H.

Staff

All Qtrs.

21.107 Social Psychology

(Prereq. 21.100 or consent) 4 Q.H.

A social psychological approach to individual behavior in social contexts; introduction to basic concepts, such as socialization, identity, self-concept, role conflict, attitudes, and

attitude measurement, groups and group processes, as well as an overview of major theoretical orientations and important substantive topics.

Profs. Golden and Levin

Fall and Spring Qtrs.

21.109 The Sociology of Everyday Life

(Prereq. 21.100 or equiv.) 4 Q.H.

The development, application, and consequences of rules for everyday activities (e.g., walking, talking, eating, drinking, sitting, smoking, laughing, crying, and sleeping); the effects of space, equipment, and territory on these activities on social life; and the expression of the emotions.

Prof. Rubington

Spring Qtr.

21.111 American Society

(Prereq. 21.100 or equiv.) 4 Q.H.

American society, culture, and major social institutions; economic, religious, governmental, familial, education, welfare, and recreational; social classes and stratification, mobility, and individualism.

Profs. Lee and Rubin

All Qtrs.

21.112 Sociology of Poverty

(Prereq. 21.100 or consent) 4 Q.H.

An analysis of American poverty in historical perspective, drawing on comparisons with other countries. Critical evaluation of sociological research and theories relating to poverty. Consideration of causes and effects of poverty, as well as societal responses to poverty and its consequences. Suitable for students in applied fields, such as nursing, criminal justice, education, allied health, pre-med, and pre-law.

Prof. Holton

Winter and Spring Qtrs.

21.116 Environment and Society

(Prereq. 21.100 or equiv.) 4 Q.H.

Traditional perceptions of environment and man, contrasting Judaeo-Christian and other cultures such as Southwest American Indian and Japanese. Origins of contemporary conservation movement and concern with resource management in America. Public policy and public response to such environmental issues as population, air and water pollution, waste disposal, and land management. Environmental quality as ideology and the search for measureable indicators. Implication of international approaches to the understanding and control of ecosystems.

Prof. Rubin

Spring and Summer Qtrs.

21.118 Population and Society

(Prereq. 21.100 or equiv.) 4 Q.H.

Traditional and contemporary approaches to human population and its control. Factors affecting birth and death rates. Societal implications of population quantity and quality in several situations, past and present. Rural-urban migration and mobility; racial, genetic, stratificational components for population analysis. Public policies and public response to fertility control in several societies. International efforts to understand to generate action on population issues.

Profs. Rubin and Holton

Fall and Winter Qtrs.

21.120 Sociology of the Family

(Prereq. 21.100 or equiv.) 4 Q.H.

The family as a social institution in several selected cultures; interrelations of the family and political, economic, and educational institutions; social nature of personality; role-taking; and the effects of individualism, mobility, and industrialism.

Profs. Holton and Lee

Fall and Winter Qtrs.

21.131 Crime, Conflict, and Justice

(Prereq. 21.100 or consent) 4 Q.H.

Analysis of social and political forces which create and perpetuate criminality in contemporary U.S. society; the impact of criminality upon law enforcement, judicial process, and the social order. Particular attention is devoted to violence as a means of resolving problems. In addition, this course examines the involvement of the legal system in processes of social conflict and change.

Prof. Garrett

Fall and Winter Qtrs.

21.135 Juvenile Delinquency

(Prereq. 21.100 or equiv.) 4 Q.H.

The sociological and psychological approaches and their implications for a typology of delinquency; problems of prevention, treatment, and rehabilitation.

Prof. Garrett

Spring and Summer Qtrs.

21.137 Social Deviance I

(Prereq. 21.100 or consent) 4 Q.H.

The conditions under which people categorize others as different; processes by which persons so defined are assigned deviant status and assume appropriate roles and self-images; development of deviant careers and their relationship to deviant subcultures; situations in which people transform deviant identity.

Profs. Rubington and Garrett

Fall and Winter Qtrs.

21.138 Social Control I

(Prereq. 21.100 or consent) 4 Q.H.

Formation of social bonds and the conditions under which they are ruptured; the emergence of deviance as an interactional problem; the types of individual and societal reactions to the most prevalent forms of deviant behavior. Analysis of agencies of social control, their definitions of problems, and responses to typical clients.

Profs. Rubington and Garrett

Fall and Winter Qtrs.

21.139 Social Problems

(Prereq. 21.100 or consent) 4 Q.H.

Analysis of five major sociological perspectives on social problems (pathology, disorganization, value-conflict, deviance, and labeling); the conditions under which certain recurrent events, activities, and persons become redefined as social problems (e.g., mine disasters, marihuana smoking, and alcoholism); study of the typical responses to social problems and their consequences.

Profs. Rubington, Holton, and Garrett

Fall and Winter Qtrs.

21.141 Drugs and Society

(Prereq. 21.100 or equiv.) 4 Q.H.

An introduction to the sociology of drugs. The course first examines social definitions of drugs, conditions of their use, and socialization into drug use. It then considers deviant drug use and effects of social control on definitions and use. A range of licit and illicit drugs will be considered but major emphasis will be given to alcohol, marihuana, and heroin.

Prof. Rubington

Fall and Winter Qtrs.

21.145 Urban Society

(Prereq. 21.100 or consent) 4 Q.H.

The foundations of city life in historical perspective; relationship of city life to environment, population, social organization, technology, and cultural values; growth trends, urbanization, and urban planning.

Profs. Rubin and Holton

Fall and Winter Qtrs.

21.150 Race and Ethnic Relations

(Prereq. 21.100 or equiv.) 4 Q.H.

Racial nationalities and religious groups, particularly with reference to the United States; special emphasis on historical development, specific problems of adjustment and assimilation, and specific present-day problems and trends.

Profs. Holton, Golden, and Lee

Fall and Winter Qtrs.

21.151 Sociology of Prejudice

(Prereq. 21.100 or consent) 4 Q.H.

Factors in the development and maintenance of prejudice and discrimination. Topics include: American race relations, anti-Semitism, sex roles, and stereotyping.

Profs. Levin, Golden, and Leibowitz

Spring Qtr.

21.155 Medical Sociology

(Prereq. 21.100 or consent) 4 Q.H.

An examination of the professions, training, institutions, and problems in health care, with an emphasis on the United States. Practical issues in the improvement of health care systems are considered.

Profs. Holton, Krause, and Rysman

All Qtrs.

21.165 Industrialism and Industrial Man

(Prereq. 21.100 or consent) 4 Q.H.

The role of industry in modern society; similarities and dissimilarities among industrial societies, bureaucracy and its alternatives, unions, supervision democracy and manipulation, the man on the assembly line, sabotage of the organization, and the role of wages and alienation.

Prof. Rysman

Fall and Winter Qtrs.

21.175 Technology and Society

(Prereq. 21.101 or consent)

Does society control technology or is technology directing society? Has technology become dehumanized? How valid is the doctrine of technological inevitability? Can the technological

"fix" be viewed as a "solution" to social problems? Is technology itself a social problem? What can be expected of "technology assessment"? What of the back-to-nature and anti-technology movements today: are they the waves of the future? These are some of the questions and issues which are discussed and analyzed. Students are expected to do considerable independent study and research.

Prof. Kaplan

Fall and Winter Qtrs.

21.176 Science and Society

(Prereq. 21.101 or consent)

The primary focus is on science rather than on technology. Exploration of the ways in which society affects, and is in turn affected by science. The emphasis is on science as a system of thought which includes a variety of methodologies and techniques, as an occupation and profession, and as one of several institutions which engage human beings and which affects the course of human history and development. Students are expected to do considerable independent study and research.

Prof. Kaplan

Spring Qtr.

21.200, 21.201 Group Behavior—The Sociological Imagination (Prereq. Consent) 4 Q.H.

Limited to 15 students. An experimental course in which students act as a group in developing sociological imagination and perspective. Responsibility for learning in the group.

Prof. Geer

Fall, Winter, and Spring Qtrs.

21.207 Seminar in Social Psychology

(Prereq. 21.100 or consent) 4 Q.H.

Focus on the interaction of psychological and group processes. Students read original theoretical and research monographs in the field. Topics may include: prejudice, reference groups, sex roles, conformity, leadership, aggression, communication, collective behavior, and achievement.

Profs. Golden and Levin

Spring Qtr.

21.215 Collective Behavior (Prereq. Consent or five Soc.-Anthropology courses) 4 Q.H.

The rise of new group forms in response to persistent social unrest; study of masses, crowds, and publics; analysis of specific instances of collective behavior such as race riots, wildcat strikes, prison revolts, and campus disorders.

Prof. Rubington

Spring Qtr.

21.217 Mass Communication and Public Opinion

(Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.

Topics include: factors in the formation and development of public opinion, the effect of television on children, mass communication as social organization, media-depicted images of society, the role of personal influence, the process of rumor, the use of the mass media by the poor, propaganda analysis, and the latent and manifest functions of mass communication.

Prof. Levin

Spring Qtr.

21.231 Sociological Theories of Crime

(Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.

Patterns and social forces involved in criminal behavior. Analysis of sociological theories of criminality and comparison of these to other explanations of crime.

Prof. Garrett

Winter and Spring Qtrs.

21.236 Applied Sociology; Practice and Theory

(Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.

An analysis of the conditions under which sociological knowledge is applied to social problems, the kinds of problems, and the degree of effectiveness of this application. Particular attention is paid to research and demonstration projects that derive from sociological theory.

Prof. Rubington

Fall Qtr.

21.237 Social Deviance II

(Prereq. 21.137 or consent) 4 Q.H.

An examination of the leading theories of deviance (anomie, subcultural deviance, labeling) and their principal variants; study of their assumptions, conceptions, proposition, and supportive evidence; analysis of empirical studies in each theoretical tradition.

Profs. Rubington and Garrett

Winter and Spring Qtrs.

21.238 Social Control II

(Prereq. 21.138 or consent) 4 Q.H.

Study of the formation of new social policies in response to social problems; analysis of policy and problem, supporters and opponents of policy change, conditions under which control agencies adopt new policies, and effects of policy change. Particular emphasis on case studies of social action and legal change.

Prof. Rubington

Spring Qtr.

21.239 Introduction to Statistical Analysis

(Prereq. 21.100 or consent) 4 Q.H.*

Application to social data of the principles of measurement, probability, measures of centrality, tests of significance, and techniques of association and correlation.

Prof. Levin

All Qtrs.

21.240 Research Methods I

(Prereq. 21.239 or consent) 4 Q.H.*

An introduction to social research, including survey techniques, design of research, interviewing, questionnaire construction, use of existing data, and content analysis. Students take part in a survey.

Prof. Golden

Fall and Winter Qtrs.

21.241 Research Methods II

(Prereq. 21.240 or consent) 4 Q.H.*

Analysis of social data by means of coding, tabulating, and statistically interpreting information from surveys and other sources.

Prof. Golden

Spring and Summer Qtrs.

21.245 Community Analysis

(Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.

Ecological, social structure, identity, and social action aspects of human settlements. Deals with change and conflict at the community level.

Profs. Rubin and Holton

Alternate Spring Qtrs.

21.246 Seminar in Urban Studies

(Prereq. 21.145 or consent) 4 Q.H.

Interdisciplinary approaches to urban studies are compared according to problem areas and research methods. Students have the opportunity to extend previous term paper projects after exposure to social action and social systemic theoretical perspectives.

Prof. Rubin

Spring Qtr.

21.250 Political Sociology; Who Gets What

(Prereq. Consent or four Soc.-Anthropology courses)

An examination of formal political structures and informal quasi-political groups. Sociological analysis of ideology, class politics, mass movements, and the conflict of various social and economic groups as they vie for political power and influence.

Profs. Krause and Lee

Fall and Spring Qtrs.

21.255 Sociology of Formal Organizations: Men, Machines, and Bureaucracy

(Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.

Principles of formal organization. Theories of bureaucracy and concept of authority; communication systems and other conceptions of formal organization. Structure of work groups and their effect on the larger organization. The social content of organizations.

Profs. Krause and Rysman

Fall Qtr.

21.260 Social Stratification: Class, Status, and Power

(Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.

Theories of social inequality, concepts of social class, aspects of status and role difference, criteria for social mobility.

Profs. Krause, Holton, and Rysman

Fall and Spring Qtrs.

21.265 Sociology of Occupations and Professions

(Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.

The meanings of work. Division of labor and specialization. Analysis of occupational structure and patterns of recruitment, training, and career preferences. The classic professions and new trends in professionalization.

Prof. Krause

Winter and Spring Qtrs.

- 21.270 Social Change** (Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.
Social and cultural dynamics, with particular reference to the current contact situation occurring between industrialized and non-industrialized societies.
Prof. Lee Spring Qtr.
- 21.280 Social Theory I** (Prereq. Four Soc.-Anthropology courses) 4 Q.H.
The development of sociology from the history of social thought. The emergence of several schools, beginning with Positivistic Organicism and Conflict Theory.
Staff Fall and Winter Qtrs.
- 21.281 Social Theory II** (Prereq. Consent or four Soc.-Anthropology courses) 4 Q.H.
A seminar-lecture course in which Formalism, Social Behaviorism, Social Action Theory, and Functionalism are studied critically.
Staff Spring and Summer Qtrs.
- 21.287 Senior Seminar** 4 Q.H.
Staff Fall, Winter, and Spring Qtrs.
- 21.290, 21.291 Directed Study**
(Prereq. Junior or Senior standing in Sociology or consent) (each) 4 Q.H.
Independent work on a chosen topic under the direction of members of the Department. Limited to qualified students with approval of Department chairman.
All Qtrs.
- 21.291 Seminar in Current Emphases in Sociology**
Review and discussion of selected sociological topics.
Staff Spring Qtr.
- 21.295, 21.296, 21.297, 21.298 Honors Program** (each) 4 Q.H.
All Qtrs.

Political Science

- 22.110 Introduction to Politics** 4 Q.H.
A broad-based introduction to contemporary political science. Areas covered include: a consideration of basic concepts in political analysis (e.g., power, authority and sovereignty); the role of governmental institutions in the making of public policy; public opinion and processes of political representation; contemporary political ideologies; and the scope and methods of political science.
Staff Fall, Winter, and Spring Qtrs.
- 22.111 Introduction to American Government** 4 Q.H.
An analysis of the American governmental and political processes, studying constitutionalism, liberties, institutions and political behavior.
Staff Fall, Winter, and Spring Qtrs.
- 22.112 Introduction to International Relations** 4 Q.H.
The elements of international relations, including sovereignty, power, and limitations on the behavior of nation-states. Problems of peace and the making of war/peace decisions are considered.
Prof. Jones Fall, Winter, and Spring Qtrs.
- 22.113 Introduction to Comparative Politics** 4 Q.H.
A comparative study of parliamentary democracy in Western Europe, Communist totalitarianism in the Soviet Union, China, and Eastern Europe, and variations of these governmental systems in the "Third World" countries of Asia, Africa, and the Middle East.
Prof. Goldman Fall and Winter Qtrs.
- 22.130 Politics and the Mass Media** (Prereq. 22.102 or 22.111) 4 Q.H.
Analyzes several facets of the mass media: the role of newspapers, radio and television in

public opinion formation; their use and effectiveness in political campaigns; their objectivity and/or bias in reporting "the news;" their impact on political parties and on the distribution of power between Congress and the President.

Prof. Gilbert

Spring Qtr.

22.131 American National Government

(Prereq. 22.102) 4 Q.H.

An analysis of the structure and functions of American government: the development of legislative policy and the nature of constitutional restraints on public power.

Prof. Worth

22.132 Political Behavior

(Prereq. 22.101 or 22.110) 4 Q.H.

Examines selected topics in contemporary political science from a political behavior perspective. Topics covered include political attitude formation and change, ideology, socialization, public opinion and voting behavior, political campaigning, political violence, and empirical democratic theory.

Prof. Goldenson

Spring Qtr.

22.133 Political Parties and Pressure Groups

(Prereq. 22.102 or 22.131) 4 Q.H.

An analysis of political parties and pressure groups in the American political system, focusing on collective decision making, electoral strategy, and party responsibility.

Prof. Pfeiffer

22.134 The American Presidency

(Prereq. 22.102 or 22.131) 4 Q.H.

A multi-faceted examination of the nation's Chief Executive. The Presidential electoral process, the President's many constituencies, and the differing styles of various 20th-century Presidents. The constitutional and extra-constitutional powers of the office are some areas that are considered.

Prof. Cord

22.135 American Constitutional Law

(Prereq. 22.102 or 22.131 and Junior or Senior status) 4 Q.H.

Employing excerpts of U.S. Supreme Court decisions and other reading materials, this course attempts an analysis of some of the theoretical, structural, and substantive issues inherent in and relevant to the American constitutional system.

Prof. Cord

22.137 Civil Liberties

(Prereq. 22.102 or 22.131 and Junior or Senior status) 4 Q.H.

Employing U.S. Supreme Court decisions and other reading material, this course examines the substantive and procedural guarantees of the Bill of Rights and the Fourteenth Amendment and their relationship to a liberal democratic society.

Prof. Cord

22.139 American Ideology

4 Q.H.

The performance of American government measured against its ideal objectives as outlined in its ideologies.

Prof. Worth

Fall and Winter Qtrs.

22.141 State Government and Politics

(Prereq. 22.102 or 22.131) 4 Q.H.

The structure, functions and politics of the states, analyzing their role in the Federal system and their relationships with the national government, and their component local governments.

Prof. Berkley

22.143 Urban and Metropolitan Government

(Prereq. 22.141) 4 Q.H.

The political, structural and functional problems of an urbanizing United States, including analyses of urban, suburban, and metropolitan governmental systems and their roles in the Federal system.

Prof. Medeiros

22.145 Housing and Urban Renewal

(Prereq. 22.102, 22.143) 4 Q.H.

The technical, budgetary, intergovernmental and social problems of housing and urban renewal.

22.146 Practical Politics

(Prereq. 22.102) 4 Q.H.

Designed to accentuate and treat systematically some of the problems of organizing for effective citizen action, partisan and nonpartisan, at the grass roots level. An exploration of roles in political campaigning.

Profs. Grimes and Pfeiffer

Fall and Winter Qtrs.

22.148 Women and Politics

4 Q.H.

This course will explore the relationship between what is and what ought to be—and why—in the roles of women in American politics. It will examine the traditional roles of women in politics, the suffrage movement, the woman as a citizen and voter, the role of sex in achieving power and in political efficacy, and the place of women in the “new politics.” Political action to promote women’s issues and modern feminism will also be covered.

Prof. Ogden

Fall and Winter Qtrs.

22.151 Comparative Government

(Prereq. 22.101) 4 Q.H.

European democratic and totalitarian forms of government. The United Kingdom, France, and West Germany.

Prof. Goldman

22.153 European Parliamentary Systems

(Prereq. 22.113) 4 Q.H.

A comparative analysis of political culture, federal and unitary forms of government, and executive-legislative relations on the national level in England, France, and West Germany.

Prof. Goldman

Spring and Summer Qtrs.

22.155 European Political Parties

(Prereq. 22.113) 4 Q.H.

Political party organization and voter behavior in England, France, and Germany with emphasis on party ideologies, strategies, campaigns and elections as well as socialization, recruitment, and participation of voters in the political process.

Prof. Goldman

Spring and Summer Qtrs.

22.171 Law and Society

4 Q.H.

Introduction to the theory and philosophy of law; the historical foundations of the common law; legal methods. Primarily for non-Political Science majors.

Prof. Grimes

Summer Qtr.

22.173 Politics and Economic Problems

(Prereq. 22.102 or 22.177) 4 Q.H.

A survey of the relationship between economic developments and political processes in the United States. Among the topics considered are: government planning of the economy, monopoly and government regulation, government programs to promote social welfare, and the impact of Federalism on the political-economic system.

Prof. Berkley

Winter and Spring Qtrs.

22.175 Current Political Issues

4 Q.H.

An analysis of the constitutional and political background of selected contemporary public issues. Primarily for non-Political Science majors.

Prof. Grimes

Fall and Winter Qtrs.

22.177 American Political Process

4 Q.H.

A general analysis of the American political system, including national, state, and metropolitan governments and their interaction. Not open to Political Science majors or anyone who has taken 22.102 or 22.131 (American National Government).

Prof. Grimes

22.178 The Politics of the Criminal Justice System

(Prereq. 22.102 or 22.177) 4 Q.H.

The criminal justice system from arrest by police to appeal to the Supreme Court of the United States. The roles of police, lawyers, judges, prosecutors, juries, and correction officers will be examined.

Prof. Berkley

Spring and Summer Qtrs.

22.179 World Politics

4 Q.H.

An analysis of the behavior of nations in international society, with emphasis on major current developments. Not open to Political Science majors or anyone who has taken 22.221 (International Relations).

22.220 The Politics of Imperialism

(Prereq. 22.112 or 22.221) 4 Q.H.

The political dynamics of penetration of foreign economies and foreign politics, considering such elements as military intervention, foreign aid, and the impact of the multi-national corporations.

Prof. Jones

Fall and Winter Qtrs.

22.221 International Relations

(Prereq. 22.102) 4 Q.H.

Elements and limitations of national power, contemporary world politics, problem of peace.

Prof. Jones

Fall and Winter Qtrs.

22.223 American Foreign Policy

(Prereq. 22.102) 4 Q.H.

Formulation and conduct of foreign policy; role of the United States in politics since 1945.

Prof. Wilfong

22.224 United States—Far Eastern Relations

(Prereq. 22.102) 4 Q.H.

Diplomacy of the United States concerning the Far East, with both Asian and non-Asian governments. Emphasis on the American role in the evolution of the Far Eastern power distribution from World War II to the present.

Prof. Jones

22.225 Soviet Government

(Prereq. 22.151) 4 Q.H.

A study of Soviet political origins and behavior, with emphasis on recent changes in the party and state apparatus, the economy, and the administration of justice.

Prof. Goldman

22.226 Soviet Foreign Policy

(Prereq. 22.101 and Middler status) 4 Q.H.

The evolution of Soviet foreign policy since 1917, with emphasis on the development of the international Communist movement and the onset of the East-West ideological conflict.

Prof. Goldman

22.227 Communism in Eastern Europe

(Prereq. 22.101 and Middler status) 4 Q.H.

The Communist governments of Eastern Europe, with emphasis on their growing independence from Soviet Russia. Recent political change, economic liberalization, and new orientation in foreign policy.

Prof. Goldman

22.228 Government and Politics in Africa

(Prereq. 22.151 and Middler status) 4 Q.H.

The governmental systems, political parties, socioeconomic problems, and foreign policies of selected states north and south of the Sahara.

Prof. Goldman

22.229 Government and Politics in North Africa

(Prereq. 22.151) 4 Q.H.

A comparative analysis of the colonial experience, nationalism, and contemporary governmental and political organization and behavior in the Maghreb (Morocco, Algeria, Tunisia), Libya, Egypt, and the Sudan.

Prof. Goldman

22.230 Government and Politics in Sub-Saharan Africa

(Prereq. 22.151) 4 Q.H.

A comparative analysis of the colonial experience, and contemporary governmental and political organization and behavior in selected states south of the Sahara.

Prof. Goldman

22.231 International Organization

(Prereq. 22.221) 4 Q.H.

Development of international organization, with special emphasis on the United Nations system.

Prof. Jones

22.233 International Law

(Prereq. 22.221) 4 Q.H.

Territory and jurisdiction of states, treaties, recognition, peaceful settlement of disputes, resort to force.

Prof. Wilfong

22.240 Totalitarianism and Dictatorship

(Prereq. 22.151) 4 Q.H.

An analysis of totalitarianism, dictatorship, and autocracy, including study of historical

background, characteristics, theories of origin, nature, and significance, evaluation of techniques, ideologies (i.e., Marxism-Leninism), policies, and institutions. Particular attention is given to Soviet and German experience.

Prof. Bursey

22.242 The Politics of Revolution and Change

(Prereq. 22.151) 4 Q.H.

An analysis of revolution and change, contemporary and historical, with attention to both theory and practice. Topics discussed include major trends in contemporary politics and society, and the relationship between political change and technological, scientific, or social change.

Prof. Bursey

22.243 Government and Politics of Communist China

(Prereq. 22.221) 4 Q.H.

Government and party organization, socioeconomic problems and policies, and foreign relations of Communist China. Attention is given to the influence of history and ideology as determinants of attitudes and behavior.

Prof. Goldman

Winter Qtr.

22.244 China's Foreign Relations

(Prereq. 22.221 or 22.112) 4 Q.H.

Examines China's traditional view of international relations and how this view was modified first by contact with the West and later by Marxism-Leninism. It investigates China's role in changing the international system to accord more with her perspectives on sovereignty and equality, and with the principles of socialist internationalism.

Prof. Ogden

Fall and Winter Qtrs.

22.245 The Politics and Policies of Developing Nations

(Prereq. 22.221) 4 Q.H.

A survey of recent political and related change among third-world countries of Africa, Latin America, and Asia. Topics included are: the heritage of colonialism and achievement of independence, the realities of cultural pluralism, revolution and political violence, institution building, political leadership and role of ideology, political parties, military in politics, and international aspects of political modernization.

Prof. Schmitt

22.247 Government and Politics of Latin America

(Prereq. 22.221) 4 Q.H.

The governmental systems, political parties, socioeconomic problems, and foreign policies of Latin American states.

Prof. Schmitt

22.250 Government and Politics of Japan

(Prereq. 22.221 or 22.112) 4 Q.H.

Examines Japan's political development from the Meiji Restoration to the present. It explores the unique form of democratic government practiced in Japan, and evaluates the effect of Japanese political theory, war, the American occupation, the Emperor and Japanese political and cultural values on Japan's political institutions. Japan's present and future impact on the international system are also considered.

Prof. Ogden

Spring Qtr.

22.255 International Relations in Asia

(Prereq. 22.221 or 22.112) 4 Q.H.

Examines power rivalries and political and economic interaction among states in East Asia. It deals with the impact of Japan and China on their Asian neighbors, and the effect of American interests and involvement on the Asian states.

Prof. Ogden

Spring Qtr.

22.259 Political Development in Revolutionary Societies

(Prereq. 22.221 or 22.112) 4 Q.H.

Examination of political development in selected revolutionary societies, including Cuba.

Staff

Spring Qtr.

22.260 Public Policy

(Prereq. 22.102 or 22.111) 4 Q.H.

An analysis and evaluation of public policy in the United States.

Staff

Fall and Winter Qtrs.

22.261 Public Administration

(Prereq. 22.102 or 22.131) 4 Q.H.

Introduction to the theory and practice of public administration, with special emphasis on the

generalities of institutions, processes, and behavior of bureaucratic organizations.

Profs. Berkley and Medeiros

22.263 Public Management

(Prereq. 22.261) 4 Q.H.

What problems are entailed in the management of public agencies? How do public managers seek to solve these problems? These questions will be explored through the use of descriptive, analytical and case materials.

Staff

Fall and Winter Qtrs.

22.264 Administrative Law

(Prereq. 22.261) 4 Q.H.

Rule-making, adjudication (formal and informal), administrative finality, judicial review, administrative procedure, scope of administrative powers, enforcement techniques, labor law, and collective bargaining.

Staff

Spring and Summer Qtrs.

22.265 The Politics of Education

(Prereq. 22.102 or 22.111) 4 Q.H.

The political dynamics of education in America, including legislation, financial support and educational policy.

Staff

Spring Qtr.

22.266 Public Personnel Administration

(Prereq. 22.261) 4 Q.H.

The basic elements of personnel administration including recruitment, training, classification, promotion, and executive development. Special attention will be given to current problems such as equal opportunity, public employee unionism and collective bargaining.

Staff

Fall and Winter Qtrs.

22.267 Public Budgeting

(Prereq. 22.261) 4 Q.H.

The politics, procedures and goals of government budgeting at the Federal, state and local levels. Aspects to be studied include expense budgeting, capital budgeting and programmed budgeting.

Staff

Spring and Summer Qtrs.

22.269 Government Accounting

(Prereq. 22.261) 4 Q.H.

Basic accounting principles and methods as used by government agencies. Included will be the utilization and interpretation of financial statements, auditing and the application of Electronic Data Processing in government record-keeping.

Staff

Spring and Summer Qtrs.

22.270 Political Theory

(Prereq. Junior status or consent of instructor) 4 Q.H.

An analytic approach to the study of key political concepts: e.g., power, stability, equality, freedom, authority, obligation.

Prof. Barkley

22.272 Selected Issues in Political Theory

(Prereq. 22.271) 4 Q.H.

Intensive examination of some dominant issues in modern political theory.

Prof. Bursey

22.273 Political Thought I

(Prereq. Junior status or consent of instructor) 4 Q.H.

An analytical and historical examination of the great political thinkers and of the main ideas in political thought from the Renaissance.

Prof. Bursey

22.274 Political Thought II

(Prereq. 22.273) 4 Q.H.

An analytical and historical examination of the great political thinkers and of the main ideas in political thought from the Renaissance to the 20th century.

Prof. Bursey

22.276 American Political Thought

(Prereq. 23.211) 4 Q.H.

The contributions to political theory of the main social, economic, political, intellectual, and philosophic movements in America from the colonial period to the present.

Prof. Barkley

22.278 Contemporary Political Thought

(Prereq. 22.101) 4 Q.H.

Analysis of current ideals, ideologies, and political movements, including Existentialism, Neo-Marxism, Black Power, Women's Liberation. The decline of ideology and behavioralism.

22.280 Research Methods in Political Science

4 Q.H.

An introduction to some of the most common methods of carrying out research in the discipline of political science. Problems of theory construction, data-gathering, and a selection of analytical research tools including bibliographical aids and the computer.

Prof. Pfeiffer

22.281 Quantitative Methods in Political Science

(Prereq. 22.280) 4 Q.H.

An introduction to data gathering methods—such as surveys, interviews, and small group methods—with field experience. Basic statistics and computer programming necessary for analysis of political data are also covered.

Prof. Goldenson

Fall, Winter, and Spring Qtrs.

22.282 Seminar in American Government

(Prereq. Senior Political Science major and consent of instructor) 4 Q.H.

A study in depth of selected topics in American government.

Prof. Worth

22.283 Seminar in International Relations

(Prereq. Senior Political Science major and consent of instructor) 4 Q.H.

A study in depth of selected topics in international relations.

Prof. Wilfong

22.284 Seminar in Comparative Politics

(Prereq. Senior Political Science major and consent of instructor) 4 Q.H.

A study in depth of selected topics in comparative politics.

Prof. Goldman

22.285 Senior Seminar in Political Science

(Prereq. Senior Political Science major) 4 Q.H.

A study in depth of selected topics in political science.

Prof. Barkley

22.286 Research Seminar in Political Science

(Prereq. 22.281) 4 Q.H.

The preparation of a research paper using techniques acquired in 22.281.

Prof. Goldenson

Spring Qtr.

22.287 The Politics of Poverty

4 Q.H.

An intensive examination of political, social, economic and legal approaches to poverty and the poor in America. The course will focus on four principal strategies for dealing with poverty: 1. rights for the poor, 2. equality of opportunity, 3. redistribution of income, and 4. rejection of material values.

22.288 Seminar in Public Law and Social Issues

(Prereq. Junior or Senior and consent of instructor) 4 Q.H.

Examines some of the continuing and perplexing social problems through the medium of legal writings and recent court cases. Issues to be discussed include abortion, euthanasia, family planning, criticism of public officials, political activism, the right of privacy, obscenity, racial and economic discrimination.

Prof. Cord

Spring Qtr.

22.289 Practicum in Public Administration

(Prereq. 22.261 and consent of instructor) 4 Q.H.

A seminar, principally for Public Administration concentrators, in which cooperative experience is studied in the classroom. Designed to bring together academic learning and practical experience in public administration.

Staff

Spring Qtr.

22.290, 22.291, 22.292, 22.293 Directed Study

(each) 4 Q.H.

Independent work under the direction of members of the Department on a chosen topic. Limited to qualified Seniors majoring in Political Science, with approval of Department.

Staff

22.295, 22.296, 22.297, 22.298 Honors Program

(each) 4 Q.H.

Staff

History

23.101 Western Civilization

4 Q.H.

The major ideas and institutions of Western Civilization from ancient times to 1648.

Prof. Fullington and Staff

23.102 Western Civilization

4 Q.H.

A continuation of 23.101, covering the period since 1648.

Prof. Fullington and Staff

23.109 Population in European History (Group A or B)

4 Q.H.

An application of the principles of demography to European history from Roman times to the present, with attention to the interaction of birth, death, marriage, and migration rates with climate change, epidemic disease, war, economic developments, social upheaval, and political policy.

Prof. Post

23.111 Ancient Greece (Group A)

4 Q.H.

The origins and development of Greek civilization; political evolution of Hellenistic society from tribal to city-state organization; growth and application of Greek religious, political, and ethical ideas.

Prof. Fullington

23.112 Ancient Rome (Group A)

4 Q.H.

Roman civilization in two sequences: 1. the rise of Roman power under the Republic, and 2. the decline of Roman power under the Empire.

Prof. Fullington

23.115 Medieval Europe (Group A)

4 Q.H.

Europe from the Barbarian Invasions to the late 13th century; the expansion of Christianity and the institutionalization of church and papacy; the emergence of the Holy Roman Empire, England, and France as political units; social, cultural, and economic developments

Prof. Francois

23.116 Europe in the Age of the Renaissance (Group A)

4 Q.H.

Europe from 1300 to 1500, when alternatives to medieval institutions became increasingly apparent. Special attention to political, economic, and cultural changes in Italy and Northern Europe.

Profs. Francois and Blaisdell

23.119 Europe in the Age of the Reformation (Group A)

4 Q.H.

Political, economic, social, and religious background of the Protestant and Catholic Reformations from 1500 to 1660. Emphasis also on the impact of the Reformation on Europe.

Profs. Francois and Blaisdell

23.120 Europe in the Age of Reason (Group B)

4 Q.H.

A survey of European history from 1660 to 1815, a time of great ferment climaxed by the French Revolution and Napoleon.

Prof. Francois

23.121 Nineteenth-Century Europe (Group B)

4 Q.H.

Europe during a century of dramatic transformation: the Industrial Revolution, the post-Napoleonic reaction; liberalism, socialism, nationalism, and imperialism.

Profs. Allen and Anderson

23.122 Europe, 1870—1921 (Group B)

4 Q.H.

Europe from the Franco-Prussian War to the post-World War I settlement: the growing tensions and rivalries, and declining certainties of the end of the 19th century, the origins of World War I, the War itself, the Russian Revolution, and the Peace of Paris. (Not open to students who intend to receive credit for 23.135.)

Profs. Herman and Stemberge

23.123 Europe Since 1921 (Group B)

4 Q.H.

Europe from the Versailles Settlement: the rise of totalitarianism, the Depression, the crises of liberalism and of the European mind, the Appeasement Era, World War II, the Cold War, the end of colonialism, and Europe today. (Not open to students who have received credit for 23.125.)

Profs. Allen, Herman, and Stembridge

23.124 Early Modern France (Group A)

4 Q.H.

Intensive study of the political, economic, social, and intellectual development of France from the end of the Hundred Years' War through the reign of Louis XIV.

Prof. Blaisdell

23.127 The French Revolution and Napoleon (Group B)

4 Q.H.

The history of France in the age of the *ancien regime* and the Enlightenment as background for the French Revolution and Napoleon.

Prof. Blaisdell

23.128 Modern France (Group B)

4 Q.H.

A survey of the chief political, social, economic, intellectual, and cultural developments of France from the Revolution to the present.

Prof. Allen

23.129 Modern Germany (Group B)

4 Q.H.

A survey of German political, economic, social and cultural history since 1815.

Prof. Allen

23.130 England to 1688 (Group A)

4 Q.H.

Prehistoric Britain, the Anglo-Saxons, the Normans, the Plantagenets, the Tudors, and the Stuarts, with emphasis on the development of parliamentary institutions until the Glorious Revolution.

Profs. Francois and Blaisdell

23.131 England Since 1688 (Group B)

4 Q.H.

England from the Glorious Revolution to the present, with emphasis on the development of Parliament, the Industrial Revolution, 19th-century reaction and reform, the World Wars, and the rise of socialism.

Profs. Backstrom and Stembridge

23.133 Stuart England (Group A)

4 Q.H.

England from 1603 to 1688, with emphasis on social and economic change and the origins of modern liberalism.

Prof. Backstrom

23.135 Victorian England (Group B)

4 Q.H.

The economic, social, and political life of the English people during Victoria's reign.

Prof. Backstrom

23.137 England Since 1900 (Group B)

4 Q.H.

The economic, social, and political life of the English people in the 20th century.

Prof. Backstrom

23.140 Imperial Russia (Group B)

4 Q.H.

The emergence of Russia as a recognized European power, westernization and expansion in the 18th century, the impact of Napoleon, reform and revolution.

Prof. Fullington

23.141 Soviet Russia (Group B)

4 Q.H.

Forces molding the history of Russia since 1917, internal developments, foreign relations.

Prof. Fullington

23.143 Ancient Middle East (Group D)

4 Q.H.

From the origins of civilization in Egypt and Mesopotamia to the break-up of the ancient world in the fourth century, with emphasis on religion and culture.

Mrs. Frothingham

- 23.144 The Middle East, 315-1800 (Group D)** 4 Q.H.
 Contacts and conflicts between East and West, emphasizing the rise and flowering of Islam.
 Mrs. Frothingham
- 23.145 The Modern Middle East (Group D)** 4 Q.H.
 The Middle East since 1800, with emphasis on the background to present problems.
 Mrs. Frothingham
- 23.147 Africa Before 1850 (Group D)** 4 Q.H.
 African prehistory, the formation of premodern societies, the dynamics of Afro-European contact before 1850.
 Prof. Anderson
- 23.150 The Commonwealth Countries (Group D)** 4 Q.H.
 The evolution of the British Empire into the Commonwealth of Nations and the development of the principal Commonwealth countries (excluding Africa). Special emphasis on the history of Canada, Australia, New Zealand, and India.
 Prof. Stemberge
- 23.151 Modern Africa (Group D)** 4 Q.H.
 The European impact on Africa, the rise of African nationalism, the emergence of independent African states, and the background of their present problems.
 Prof. Anderson
- 23.152 Africa: National Histories (Group D)** 4 Q.H.
 Special studies of the histories of selected African nations.
 Prof. Anderson
- 23.153 West African History (Group D)** 4 Q.H.
 The political, economic, social, and cultural history of the people of West Africa.
- 23.169 Far Eastern Civilization to 1850 (Group D)** 4 Q.H.
 Premodern histories and cultures of China, Japan, and Korea from antiquity to 1850.
 Prof. Anderson
- 23.170 Modern Far East (Group D)** 4 Q.H.
 The Far East from 1850 to 1945, with emphasis on China and Japan and their relations with other nations.
 Prof. Ring
- 23.171 The Far East Since 1945 (Group D)** 4 Q.H.
 The Far East, especially China and Japan, since the end of World War II.
 Prof. Ring
- 23.181 European Economic History to 1750 (Group A)** 4 Q.H.
 The major economic developments of Europe, including studies in agriculture, commerce, and industry.
 Prof. Francois
- 23.182 Modern European Economic History (Group B)** 4 Q.H.
 Survey of the development of the Western world examined within the framework of economic theory, with attention to social and political ramifications.
 Prof. Post
- 23.197 Women in History (Group A or B)** 4 Q.H.
 An examination of the changing roles of women from Ancient Greece through the French Revolution.
 Profs. Blaisdell and Francois
- 23.199 The Historian's Craft** 4 Q.H.
 The ways in which the historian studies the past and the nature of historical statements. Problems considered include research techniques, changing conceptions of historical knowledge, and the relationship between the historian and the society in which he works.
 Prof. Post

23.200 Interdisciplinary Methods

4 Q.H.

Introduction to social science methodology and quantitative techniques used in historical analysis.

23.201 Colonial America (Group C)

4 Q.H.

The discovery and exploration of the New World, the settlement of the English colonies on the North American mainland, their development to 1763, and the origin of their clash with England.

Prof. Fowler

23.202 The American Revolution (Group C)

4 Q.H.

The coming of the American Revolution, its nature and progress, and its political, economic, and social aftermath.

Prof. Fowler

23.210 The United States to 1877

4 Q.H.

The history of the American people from 1763 to 1865, with an analysis of the American Revolution and of the major political, constitutional, diplomatic, economic, and social problems of the new nation.

Prof. Robinson and Staff

23.211 The United States Since 1877

4 Q.H.

A continuation of the survey of American history, with discussion of the emergence of an industrial economy, an urban society, world responsibility, and expanded Federal government.

Prof. Robinson and Staff

23.213 American Urban History (Group C)

4 Q.H.

The development of urban society in the United States in the 19th and 20th centuries, with emphasis on the effects of immigration and industrialization upon the politics, thought, and society of American cities.

23.215 The United States, 1781—1825 (Group C)

4 Q.H.

The political, economic, and psychological problems of adjustment to peace at the conclusion of the American Revolution; the development of an independent nation to 1825.

23.216 American Reformers and Reform Movements (Group C)

4 Q.H.

An analysis of American reform, especially in the 19th century.

Prof. Jacobs

23.218 The Civil War and Reconstruction (Group C)

4 Q.H.

The coming of the Civil War, its nature and progress, and the aftermath of Reconstruction.

Prof. Jacobs

23.220 The United States, 1890—1920 (Group C)

4 Q.H.

Populism, progressivism, World War I, and the reaction of the 1920s.

Prof. Bishop

23.221 The United States, 1920—1945 (Group C)

4 Q.H.

The Depression, the New Deal, World War II, and mid-century, emphasizing the clash between liberalism and conservatism and the movement from isolationism to interventionism.

Prof. Bishop

23.222 The United States Since 1945 (Group C)

4 Q.H.

America's diverse responses to the postwar challenges of urbanization, economic change, civil rights, and Communism.

23.228 American Political Parties (Group C)

4 Q.H.

An examination of the emergence and development of parties from the Constitution to mid-20th century, with attention to their support, programs, and function.

Prof. Campbell

23.231 American Immigration (Group C)

4 Q.H.

An examination of immigration to the United States and its effect on American society.

Prof. Campbell

- 23.241 Afro-American History to 1895 (Group C)** 4 Q.H.
The black experience in colonial America and the United States to 1895, with special emphasis on the slave trade, slavery, the ante-bellum free black, black abolitionism, and the role Afro-Americans played during the Civil War and Reconstruction.
Prof. Jacobs
- 23.242 Afro-American History Since 1895 (Group C)** 4 Q.H.
The black struggle against white racism from the era of accommodation to black power, emphasizing the contributions made by the major Afro-American leaders of the 20th century.
Prof. Jacobs
- 23.250 American Historians (Group C)** 4 Q.H.
The literature of American history; major American writers of American history from the colonial period to the present, with emphasis on changing form and substance.
Prof. Robinson
- 23.251 American Biography (Group C)** 4 Q.H.
The history of American biography since 1789 and biographies of representative Americans.
Prof. Robinson
- 23.252 Poverty in America (Group C)** 4 Q.H.
The life of the poor in America, especially in the 19th and 20th centuries.
Prof. Robinson
- 23.253 American Elites (Group C)** 4 Q.H.
The life of elite individuals and groups in American society, especially in the 19th and 20th centuries.
Prof. Robinson
- 23.276 Latin America to 1850 (Group D)** 4 Q.H.
The fusing of the cultures of the Indian, the Iberian, and the Negro; the European and American forces which gave rise to the Latin American wars for independence; the early development of the new nations.
Prof. Bishop
- 23.277 Modern Latin America (Group D)** 4 Q.H.
Latin America from the mid-19th century to the present; dictatorial republics and the continuation of poverty and injustice; the struggles toward democracy, the rise of nationalism, and the threat of Communism; the relations between the United States and Latin America.
Prof. Bishop
- 23.288 Seminar in Medieval History (Group A)** 4 Q.H.
Prof. Francois
- 23.289 Seminar in European Intellectual History (Group B)** 4 Q.H.
Not open to students who received credit for 23.126.
Prof. Herman
- 23.290 Seminar in Modern European History (Group B)** 4 Q.H.
Prof. Francois
- 23.291 Seminar in American History (Group C)** 4 Q.H.
Prof. Campbell
- 23.292 Seminar in Early Modern Europe (Group A)** 4 Q.H.
Prof. Francois
- 23.293 Seminar in the History of Socialist Thought (Group B)** 4 Q.H.
Prof. Backstrom
- 23.294 Seminar in French History (Group A or B)** 4 Q.H.
Profs. Allen and Blaisdell
- 23.295, 23.296, 23.297 Honors Program** (each) 4 Q.H.
Staff Fall, Winter, and Spring Qtrs.

23.299 Directed Study
Staff

4 Q.H.
All Qtrs.

Afro-American Studies

25.050 Educational Issues for Black Americans

(Prereq. 25.251 or consent of instructor) 4 Q.H.

Issues in alternative schools, curricula, funding, and outcomes that concern black people. These issues are researched and critically analyzed as to what effect they will have on black America. The course takes the format of a seminar, with well-known guest speaker presentations integrated with usual class presentations.

25.051 Community School Approaches

4 Q.H.

25.100 Science and Black Society I

4 Q.H.

A firm foundation in science and scientific method is the groundwork for an interesting look at the implications of scientific investigations on black society. Has science really enriched the black society or has it hindered it? What are the far-reaching effects of the Tuskegee Project, the Eugenetics of Jensen and Shockley, legalized abortion and the population explosion, National Institutes of Health (NIH)-granted policies, the shortage of black physicians? What has been the role of blacks in science? In short, we examine a myriad of questions in order to elucidate the interrelationships between science and black society.

25.101 Science and Black Society II (Prereq. 25.100 or consent of instructor) 4 Q.H.

25.109 Contemporary Black Issues in Statistics

4 Q.H.

25.121 Urban Seminar

4 Q.H.

Will review basic issues in community economic development among minority communities.

Prof. Jackson

Winter and Spring Qtrs.

25.130 Black Poetry

25.140 Language Arts (Prereq. 30.113 and consent of instructor) 4 Q.H.

Designed to sharpen the student's language skills, emphasizing the achievement of linguistic analysis and precision in English despite its second-language status for many blacks, and its several inherently anti-black uses and connotations.

25.141 Elementary Swahili 4 Q.H.

Essentials of grammar; practice in pronunciation and progressive acquisition of a basic vocabulary; idiomatic expressions.

25.143 Intermediate Swahili (Prereq. 25.142) 4 Q.H.

Review of grammar, with practice in composition and conversation.

25.145 Elementary Arabic 4 Q.H.

Essentials of grammar; practice in pronunciation and progressive acquisition of a basic vocabulary; idiomatic expressions.

25.147 Intermediate Arabic (Prereq. 25.145 or consent of instructor) 4 Q.H.

Review of grammar, with practice in composition and conversation.

25.149 Introduction to African Languages 4 Q.H.

25.150 Blacks and the Media 4 Q.H.

25.170 Economic Problems of Black Americans 4 Q.H.

The correlation among social, political, and economic conditions of black people in the United States.

25.171 Poverty and Health Care 4 Q.H.

25.172 Community Medicine and Delivery of Health Care 4 Q.H.

25.180 Black Diseases 4 Q.H.

25.181 Black Nutritional Habits 4 Q.H.

25.210 Contemporary Problems in Black Society	4 Q.H.
Study of contemporary psycho-political problems. From a study of this area in its global generality should come a careful paper on problem-solving in a specific area.	
25.212 Politics of the Black Family	4 Q.H.
Anthropological and sociological theories and concepts as they relate to the black family in Africa and in the diaspora. The theories and concepts will deal with variations in family structure and function, their correlation to economic and political organization, the traditional and modern function of family in society, the effect of slavery and colonization on black family structure and function, and similarities and differences in African, African-American, and African-Caribbean families.	
Prof. Cooper	Fall and Spring Qtrs.
25.216 Black Experience in the Caribbean	4 Q.H.
Prof. Marshall	All Qtrs.
25.217 The Black Family	4 Q.H.
25.218 The Black Man/Black Woman	4 Q.H.
25.219 Researching Black Issues	4 Q.H.
25.220 African Politics	4 Q.H.
Staff	Fall, Winter, and Spring Qtrs.
25.221 Black Ideologies	4 Q.H.
An evaluation of the problem-solving techniques which have been developed through black peoples' experience in recent years. This course seeks to scrutinize these techniques and/or programs. The arenas in which such programs operate are appraised carefully from a political perspective. The course objective is to redefine political science toward dealing with the current realities by some of the available means. The methodology is analysis and criticism.	
Prof. Speight	Fall and Spring Qtrs.
25.222 Third World Political Relations	4 Q.H.
Introductory course to theory and practice of relations among nations. Special attention will be given to relations between the have and have-not nations. Emphasis on Third World problems.	
Prof. Persons	Fall and Winter Qtrs.
25.223 Urban Politics	4 Q.H.
Prof. Persons	Spring Qtr.
25.224 Urban Bureaucracy and the Black Community	4 Q.H.
Prof. Clay	Fall and Winter Qtrs.
25.230 African History	4 Q.H.
Staff	Fall, Winter, and Spring Qtrs.
25.240 Afro-Americans and the Law	4 Q.H.
Prof. Owens	Fall and Spring Qtrs.
25.249 Minority Business Needs	4 Q.H.
Prof. McClellan	Winter and Spring Qtrs.
25.250, 251 Foundations of Black Culture I, II	4 Q.H.
An overview of the rich and varied aspects of life for all people of African descent. 25.250 studies black culture from ancient African cultures through the Civil War, and 25.251 from Reconstruction to the 70s. This introductory course in Afro-American Studies is team-taught by staff in history, literature, music, drama, education, human services, philosophy, and social sciences.	
25.252 Organizing Black Communities	4 Q.H.
A seminar designed for those students whose concerns and future professional involvements might be in the urban community.	
25.253 Seminar: Wright/Ellison	
(Prereq. Freshman English and consent of instructor)	
Detailed study of the works of Richard Wright and Ralph Ellison. Designed for junior and	

senior students with an interest in literary style and content of these two exemplary black writers.

25.254 Black Community and Social Change

(Prereq. 25.251 or consent of instructor) 4 Q.H.

Study of those components of the black community which exercise (active or passive) social control: the black church family, ethos. What environmental factors make us what we are? What environmental controls make for change? For what kind of change?

Offered 1974-75

25.255 Policy Analysis and the Black Community (Prereq. Consent of instructor) 4 Q.H.

Introduces students to the analysis of policies, as they affect the black community and the inner city. The focus in the first part would be on techniques (non-quantitative) and in the last part on specific policies and programs, including those relating to poverty, housing, education, drugs, and community development.

Prof. Clay

Fall and Spring Qtrs.

25.256 African Civilization

4 Q.H.

Staff

Fall, Winter, and Spring Qtrs.

25.257 Field Seminar

(Prereq. Consent of instructor) 4 Q.H.

A practical program of carefully supervised field work, designed to provide a special opportunity for career preparation. First-hand knowledge of the realities of working in a given situation are expected to begin development. This course is closely supervised by the appropriate staff member in a given area, and is intended to supplement classes and co-op in a particular area of career preparation.

Offered 1974-75

25.258 Directed Study

(Prereq. Consent of instructor) 4 Q.H.

A scholarly piece of independent research under the supervision of an instructor or professor of Afro-American Studies (or, by mutual consent, another Department). The student is expected to choose an academic problem of particular interest to him, in light of his career preparation, and to develop the tools to show how it might be solved.

Offered 1975-76

25.259 Directed Study Toward Senior Thesis (Prereq. Consent of instructor) 4 Q.H.

All majors are required to do a substantive senior thesis. Advisors in the student's area work closely with each candidate to show how his scholarly and career preparation best merges into a final project; where applicable, a field work component is encouraged.

Offered 1975-76

25.260 Black Ethics

4 Q.H.

Philosophical treatment of changes in traditional Western ethics produced by such notions as "Black Power," "The New Morality," "The New Left." Should be especially useful for students in philosophy, criminal justice and Afro-American studies programs.

Prof. Edelin

Winter Qtr.

25.261 Seminar: W.E.B. DuBois

4 Q.H.

Prof. Edelin

Spring Qtr.

25.262 History of Black Ideas

4 Q.H.

Prof. Edelin

Fall Qtr.

25.270 Black Aesthete in Design

4 Q.H.

25.271 History of Afro-American Art

4 Q.H.

25.280 African Rhythms and Harmonies

4 Q.H.

25.281 Black Music

4 Q.H.

General survey of Afro-American music in the U.S., traced from its origins in Africa to the present. Intended to introduce the student to the vast and rich expanses of black musical culture from a musical and socio-historical standpoint.

The following courses may also be of interest to the student wishing to concentrate in Afro-American Studies. Descriptions for these courses may be found in the appropriate departmental listing.

21.145	Urban Society
21.150	Race and Cultural Relations
21.270	Social Change
20.250	Political Anthropology
20.255	Economic Anthropology
20.259	Urban Anthropology
22.132	Political Behavior
22.133	Political Parties and Pressure Groups
22.137	Civil Liberties
22.171	Law and Society
22.228	Government and Politics in Africa
22.229	Government and Politics in North Africa
22.233	International Law
22.242	The Politics of Revolution and Change
22.245	The Politics and Policies of Developing Nations
22.270	Political Theory
22.278	Contemporary Political Thought
23.241	*Afro-American History I
23.242	*Afro-American History II
23.153	West African History
26.101	Introduction to Philosophy I
26.102	Introduction to Philosophy II
26.155	Moral Philosophy
26.120	Existentialism
26.131	Social Philosophy
30.253	Seminar: Wright/Ellison/Baldwin
30.267	*Afro-American Literature I
30.268	*Afro-American Literature II
30.269	The Black Novel
30.276	African Literature

**Required for majors*

Philosophy

26.101, 102 Introduction to Philosophy I and II (each) 4 Q.H.

An examination of some of the central and persistent issues in philosophy. These courses are independent and may be taken in reverse order. Both emphasize philosophical thinking as an activity rather than the assimilation of an established body of facts. 26.101 includes such topics as theories of reality, theories of knowledge, and philosophical problems in religion. 26.102 includes such topics as social and political philosophy and philosophies of art and history.

Staff

26.101-Fall and Winter Qtrs.

26.102-Spring and Summer Qtrs.

26.110 Great Philosophers I: Thales to Aristotle (formerly History of Ancient Philosophy) 4 Q.H.

From early Greek philosophy before the time of Socrates to Aristotle. Emphasis upon the thought and influence of Socrates, Plato, and Aristotle.

Prof. Nathanson

Fall and Winter Qtrs.

26.111 Great Philosophers II: Descartes to Kant (formerly **History of Modern Philosophy**)

4 Q.H.

European philosophy from the Renaissance to the 19th century; emphasis upon Francis Bacon, Descartes, Spinoza, Locke, Berkeley, Hume, and Kant.

Prof. DeAngelis

Spring and Summer Qtrs.

26.117 Nineteenth-Century Philosophy

(Prereq. 26.110 and 26.111 or consent of instructor) 4 Q.H.

Selected trends in this century, such as the development of German idealism, romanticism, evolutionism, materialism, and positivism. Hegel, Schopenhauer, Nietzsche, Kierkegaard, and Marx are representative.

To be announced

26.118 Twentieth-Century Philosophy

(Prereq. 26.110 and 26.111 or consent of instructor) 4 Q.H.

Contemporary philosophic movements in metaphysics and methodology exemplified by process philosophy, linguistic analysis, pragmatism, phenomenology, and existentialism.

To be announced

26.119 American Philosophy

(Prereq. 4 Q.H. philosophy or consent of instructor) 4 Q.H.

Background to American philosophy: Locke, Newton, Jonathan Edwards, and Cadwallader Colden. The American Enlightenment: Jefferson, Paine, and Benjamin Rush. Pragmatism: Peirce, James, Dewey, and Meade. Realism: Perry and Sellars. All of the above are dealt with in this course.

Prof. Hacker

26.120 Existentialism

(Prereq. 4 Q.H. philosophy or consent of instructor) 4 Q.H.

Existentialist philosophy (Kierkegaard, Nietzsche, Dostoevski, Heidegger, Jaspers, Sartre, Camus) examined in relation to contemporary human sciences, psychology, and psychoanalysis. Special attention devoted to theories on man and self-alienation.

Prof. Kovaly

Fall and Winter Qtrs.

26.121 Analytic Philosophy

(Prereq. 8 Q.H. philosophy or consent of instructor) 4 Q.H.

The development of the analytic movement from its beginnings in the early works of Moore and Russell. Some treatment of Russell's logical atomism, the logical positivists, the thought of Ludwig Wittgenstein, and their widespread influence.

Prof. DeAngelis

26.130 Aesthetics

4 Q.H.

An analysis of the nature and meaning of aesthetic experience and the principles of art criticism. The possibility of standards in art and the relation of art to ethics, society, and religion are discussed.

Prof. Hacker

Fall and Winter Qtrs.

26.131 Social and Political Philosophy

(Prereq. 4 Q.H. philosophy or consent of instructor)

Philosophic theories on man and society, social change and institutions. Readings from Plato, Aristotle, Machiavelli, Locke, Rousseau, American 18th century, Hegel, Marx, Sartre, Camus, Marcuse, Fanon, Mao, Niebuhr, Sidney Hook. Major attention will be given to 20th century social theories.

Prof. Kovaly

Not offered 1974-75

26.133 Philosophy of Science

(Prereq. 8 Q.H. natural or social science)

Analysis of distinguishing characteristics of the scientific enterprise; the role of theory, observation, and experiment; significance of paradigms to claims of objectivity; effects of differing methodology on content; and problems about the relation between various sciences.

Prof. Lipton

Spring Qtr.

26.134 Philosophy of Religion

(Prereq. 4 Q.H. religion or consent of instructor)

An examination of such topics as: the existence of God derived from reflection on Nature and experience, and the logical status of religious belief and faith in a rational person.

Prof. Wellbank

Spring Qtr.

26.135 Philosophy of Man

(Prereq. 4 Q.H. philosophy or consent of instructor)

An historic, philosophical inquiry into different theories of man, dimensions and characteristics of man, with a special interest in conceptions of the alienation of man. Selected readings include: Descartes, Hobbes, Hegel, Marx, Kierkegaard, Maritain, Fromm, Marcuse and Frankel.

Prof. Kovaly

26.137 Philosophy and Literature

4 Q.H.

Analysis of basic philosophic themes expressed in such writers as: Tolstoy, Dostoevski, Thomas Mann, Sartre, Camus, Kafka, Hesse, Bellow, and others.

Prof. Kovaly

26.143 Vonnegut as Philosopher

Philosophical themes in the work and thought of Kurt Vonnegut, Jr. His novel view of human society and its relationship to art, technology, and history will provide a general background. Within this, his treatment of the meaning of life, the nature of a person, the mysteries of language and the possibility of time-travel will be discussed. Vonnegut's novels and other materials will be used.

Prof. DeAngelis

Fall and Winter Qtrs.

26.150 Introduction to Logic

4 Q.H.

Recognition of common fallacies, practical exercises in effective argument, formal principles of correct and incorrect reasoning; entails traditonal, deductive logic. Included are formal and informal fallacies.

Prof. Hacker and Staff

All Qtrs.

26.151 Symbolic Logic

Presentation of first-order deductive logic. Analysis of the notion of proof and techniques for constructing proofs. The theory of identity, and results on consistency, completeness, and decidability will be presented.

Prof. Lipton

Fall and Winter Qtrs.

26.152 Theory of Knowledge (formerly Epistemology)

(Prereq. 4 Q.H. philosophy or consent of instructor)

Major theories, problems and concepts in the theory of knowledge: problems of scepticism and the justification of beliefs; the nature of knowledge and truth; relation of reason and experience to knowledge.

Prof. Nathanson

Spring Qtr.

26.153 Metaphysics

(Prereq. 4 Q.H. philosophy or consent of instructor)

Some central notions of metaphysics, including identity, existence, number, matter, and casuality.

To be announced

Not offered 1974-75

26.155 Moral Philosophy (formerly Ethics)

(Prereq. 4 Q.H. philosophy or religion, or consent of instructor) 4 Q.H.

Topics in philosophical ethics: the nature and basis of value judgments, the concepts of justice, human rights, punishment, moral obligation and goodness. Ethical relativity, utilitarianism, deontology and emotivism are the chief meta-ethical theories considered.

Prof. Wellbank

Fall and Winter Qtrs.

26.156 Modern Ethical Theories

(Prereq. 26.155 or consent of instructor) 4 Q.H.

The aim is to study intensively some recent major developments in moral philosophy. The topics selected are: the cognitivist-noncognitivist controversy in meta-ethics, the concept of social justice in normative ethics, human rights, punishment, and the adequacy of rule utilitarianism as a normative ethical theory.

Prof. Wellbank

26.171 Hinduism and Buddhism (formerly Oriental Religions)

4 Q.H.

Description and interpretation of the major Indian traditions which will attempt to establish their fundamental characteristics. Attention will be given to the development of Mahayana Buddhism in Tibet, China, and Japan; and to the ways of knowledge, devotion, duty, and meditation in the Hindu tradition.

Prof. Pruett

Spring and Summer Qtrs.

26.172 Revivalism, Utopianism, and the American Republic (formerly American Faiths)

4 Q.H.

Investigates basic religious themes in American culture. Dominant theme is the notion that America is (or should be) the "Promised Land." Studies attempts to make America into a promised land or to convert its people to true religiosity (revivalism) or to separate from the "false Christians" and form a "pure" community (utopianism). "Righteousness" as a pervasive American trait is investigated in two historical forms: religious fervor on the eve of the Civil War and the various kinds of fervor that arose in the confusion of the late 1960s.

Prof. Haule

Spring Qtr.

26.174 Christian Faith and the Problem of Interpretation

4 Q.H.

An examination of 20th-century attempts at understanding the meaning of Christian faith. Beginning with some of the classical approaches to New Testament interpretation, the study concentrates on issues raised by Albert Schweitzer's "Quest of the Historical Jesus," Rudolph Bultmann's "Demytheologizing," and the problem of the new hermeneutics.

Staff

26.175 Faith and Tradition in India

4 Q.H.

An examination of selected historical, philosophical, and theological elements of Indian tradition, with special emphasis on post-Buddhist periods. The influence of Indian thought in the Far East is examined, as well as the influence of British Western civilization on Indian culture.

Prof. Pruett

26.177 Understanding Religious Man

4 Q.H.

An examination and critical analysis of the major methods and definitions of religion, with emphasis on the anthropological, sociological, theological, and phenomenological means of isolating religious experience. The issues of the nature and function of religion are discussed.

Staff

Fall and Winter Qtrs.

26.178 Religion in a Social Context

4 Q.H.

An exploration of the social forms of religion. The structures and roles of the church, synagogue, and sect are described and critically evaluated. In addition, emphasis is given to their function, with reference to general social structure, process, and reform.

Staff

26.180 Myths and Dreams as Religious Experience

4 Q.H.

An inquiry into the basic dimensions of religious experience as illuminated by myths and dreams. A reading of myths from both Eastern and Western cultures in order to elucidate the world pictures they create. An attempt is made to identify the questions of man and world to which these myths respond.

Staff

Fall and Winter Qtrs.

26.181 Paradigms for Religious Experience

4 Q.H.

A study of selected spiritual leaders and founders of religion such as Buddha, Socrates, Confucius, and Jesus, the unique dimensions of whose life and teachings provide paradigms for religious experience. It is an attempt to identify the concrete meaning of religious experience, to discover the means of communicating faith, and to describe the relations as well as differences between the "teacher" and "saviour."

Staff

Spring and Summer Qtrs.

26.182 Religion in the Age of Science

4 Q.H.

An examination of the problems posed by the interaction between religion and the natural

and social sciences. Representative selections from David Hume, Charles Darwin, Karl Marx, Sigmund Freud, Eric Ericson, and Ernest Troeltzch are used to interact with selections from Rudolph Bultmann, Teilhard de Chardin, Reinhold Niebuehr, Dietrich Bonhoeffer, and Paul Tillich.

Staff

Fall and Winter Qtrs.

26.183 Ways of Being Religious

4 Q.H.

Seeks to identify and appraise different ways of approaching religion: studies five different religious ways of life — the ways of sorcery, dogma, zen, individuation, and revitalization cults. Emphasis will be placed upon appreciating the unique standpoint that each "way of being religious" requires and how each sees the world in a radically different way. Each has its own distinct idea of what is real, what is true, what is good, and in what happiness consists.

Prof. Haule

Spring Qtr.

26.184 Freud, Jung, and Religion

4 Q.H.

The psychologies and theories of religion of Freud and Jung and their views on the nature of symbolic systems and cultural symbols. The course attempts to answer such questions as: Is religion a socially formalized and justified neurosis? Is it social therapy? Are religious symbols throwbacks to childhood or are they the means by which we can finally reach enlightenment?

Prof. Haule

Fall and Winter Qtrs.

26.185 Atheism: East and West

4 Q.H.

A survey of some of the major approaches to the question of the meaning of life that deny or ignore God. Ancient China as a godless but religious culture is emphasized in the first part of the course. This emphasis includes Taoism, Buddhism, and Confucianism. The relatively stable world-view of Ancient China is compared and contrasted with the vying godless world-views of the West, including Marxism and other secular humanisms.

Prof. Haule

Fall and Winter Qtrs.

26.190, 191, 192 Honors Program

(Prereq. Faculty approval, by arrangement) (each) 4 Q.H.

Students interested in taking HONORS should confer with Prof. Fogg.

Staff

All Qtrs.

26.201 Area Course: Mind and Language

(Prereq. 4 Q.H. philosophy or consent of instructor)

Contemporary challenges to mind-body dualism by linguistic philosophers, with emphasis upon their analyses of such concepts as intelligence, consciousness, will and rationality. Recent views concerning the effects of language on thought, perception, and world-views are also discussed.

Prof. DeAngelis

Fall and Winter Qtrs.

26.203 Existential Phenomenology (Prereq. 4 Q.H. philosophy or consent of instructor)

Husserl's phenomenological method as an inspiration for contemporary existential psychology and existential psychoanalysis. Works of Sartre, Merleau-Ponty, R.D. Laing, Victor Frankel examined in contrast and conflict with psychological theories of Freud, Sullivan, Horney, Fromm, Maslow, Koestler, and Skinner. Students will be encouraged to bring in their own academic background to bear on theoretical aspects of areas dealt with.

Prof. Kovaly

Spring Qtr.

26.234 Advanced Philosophy of Religion (Prereq. 26.134 or consent of instructor) 4 Q.H.

A critical inquiry into such problems in religious belief as: the criteria for demythologization, the logic of prayer, faith, miracles, and revelation, and the general problem verification of religious belief.

Prof. Wellbank

Spring Qtr.

26.256 Seminar: Moral Philosophy

(Prereq. 26.155, 26.156, or consent of instructor) 4 Q.H.

An intensive examination of some meta-ethical problems associated with contemporary utilitarianism, such as the possibility of a non-cognitive utilitarianism, universalizability, and

ethical argument, and such normative problems as social justice, human rights, and punishment.

Prof. Wellbank

Fall and Winter Qtrs.

26.261 Seminar in Plato (Prereq. 8 Q.H. philosophy or consent of instructor) 4 Q.H.

To be announced

Not offered 1974-75

26.262 Seminar in Aristotle (Prereq. 8 Q.H. philosophy or consent of instructor) 4 Q.H.

To be announced

Not offered 1974-75

26.265 Seminar in Wittgenstein

(Prereq. 8 Q.H. philosophy or consent of instructor) 4 Q.H.

The overall development of Wittgenstein's thought, with special emphasis upon his later work as presented in the *Philosophical Investigations*. Subjects of importance include: language and thought, meaning, philosophical psychology, knowledge and experience, the nature of philosophy.

Prof. DeAngelis

Spring Qtr.

26.266 Seminar in Dewey (Prereq. 8 Q.H. philosophy or consent of instructor) 4 Q.H.

Prof. Hacker

Spring Qtr.

26.267 Seminar in Nietzsche (Prereq. 8 Q.H. philosophy or consent of instructor) 4 Q.H.

To be announced

Not offered 1974-75

26.268 Seminar in Russell (Prereq. 8 Q.H. philosophy or consent of instructor) 4 Q.H.

Russell's thought, with emphasis on his views concerning knowledge, language, mind, and matter; his influence on contemporary thought. Some attention paid to his social and political writings.

Prof. Nathanson

Fall and Winter Qtrs.

26.272 American Faiths

4 Q.H.

Denominational institutions as influential forces in American society, and the religious and ideological commitments of Americans.

Staff

Spring Qtr.

26.274 Seminar in Judaism (Prereq. 8 Q.H. philosophy or consent of instructor) 4 Q.H.

Prof. Pruett

26.275 Contemporary Religious Issues in the Western World

(Prereq. 26.174 or consent of instructor) 4 Q.H.

An analysis of some major developments in Christianity and Judaism in the context of industrialization and urbanization. An exploration of the impact of secularism upon the religions of the West as evident in Neo-Orthodoxy, Bonhoeffer's "Religionless Christianity," the radical theology of the death of God, and the trends toward a new humanism.

Staff

Fall and Winter Qtrs.

26.276 Mysticism: East and West (Prereq. 26.177, 26.180, or consent of instructor) 4 Q.H.

An inquiry into mystical experience through a comparative study of the writings of Christian, Buddhist, and Hindu mystics, and secondary interpretive sources. Areas taken up are: the potential oneness of man and God, the conflict of mystics with traditional forms of religion, and the possibility of a common cross-cultural basis for mysticism.

Prof. Pruett

Spring Qtr.

26.279 Issues in Contemporary Islam

(Prereq. 26.177, 26.180, or consent of instructor) 4 Q.H.

A discussion of such issues in 20th-century Islam as: Pan-Islamic movements; relations with Israel and the West; the Qu'ran as lawbook; social change in modern Islamic countries through Western influence; variation on the theme of Islam in Africa, Turkey, and Iran; and the Muslim view of history.

Prof. Pruett

Art

- 27.113 Creative Drawing** 4 Q.H.
Creative drawing in pen and ink, pencil, and crayon, with emphasis on form and texture.
Prof. Wells Winter and Spring Qtrs.
- 27.114 Theory of Color and Design** 4 Q.H.
Techniques and theories of design and color in painting.
Prof. Bishop Not offered 1974-75
- 27.115 Basic Painting** 4 Q.H.
Practice and creative expression in the basic techniques of painting, including study of color, space and form.
Prof. Bishop Fall, Winter, and Spring Qtrs.
- 27.116 History of Film Art I** 4 Q.H.
A history of the development of film art from the late 19th century to the 1930s. Selected films are screened and studied. Lab fee.
Prof. Bishop Not offered 1974-75
- 27.117 History of Film Art II** 4 Q.H.
A history of the development of film art from the 1930s to the present. Selected films are screened and studied. Lab fee.
Prof. Bishop Spring Qtr.
- 27.118 History of Art I** 4 Q.H.
A survey of Western art from prehistoric times to the Renaissance.
Prof. Davis Fall Qtr.
- 27.119 History of Art II** 4 Q.H.
A survey of Western art from the Renaissance to the 20th century.
Profs. Wells and Serenyi Spring Qtr.
- 27.120 French Film** 4 Q.H.
A survey of French film making from the late 19th century to the present. Selected films are screened and studied. Lab fee.
Prof. Bishop Not offered 1974-75
- 27.121 Contemporary Directions in Cinema** 4 Q.H.
A comparative study of selected films by major contemporary directors. Films are screened and studied. Lab fee.
Prof. Bishop Not offered 1974-75
- 27.131 Ancient Painting and Sculpture I** 4 Q.H.
A concentrated study of art from prehistoric times to Greek civilization, including Egyptian, Mesopotamian, and Aegean art.
Prof. Davis Not offered 1974-75
- 27.133 Italian Renaissance Art I** 4 Q.H.
A study of Italian painting and sculpture of the 14th and 15th centuries.
Prof. Serenyi Not offered 1974-75
- 27.136 Classical Art** 4 Q.H.
A concentrated study of Greek and Roman art.
Prof. Davis
- 27.137 Nineteenth-Century Painting** 4 Q.H.
European painting of the 19th century, with special emphasis on romanticism, realism, and impressionism.
Prof. Serenyi
- 27.139 Medieval Painting and Sculpture** 4 Q.H.
Romanesque and Gothic painting and sculpture from the 10th to the 15th centuries.

27.141 Baroque and Rococo Painting

4 Q.H.

European painting of the 17th and 18th centuries.

Prof. Wells

27.143 Mexican Art

4 Q.H.

A concentrated study of Pre-Columbian art from the Archaic and Classical periods to the present.

Prof. Davis

Fall and Winter Qtrs.

27.144 Latin American Art

4 Q.H.

The arts of architecture, sculpture, and painting of various countries of Latin America except Mexico, from Pre-Columbian times to the 20th century.

Prof. Davis

27.148 European Graphic Arts

4 Q.H.

The history of graphic arts from the medieval period to the end of the 19th century. The development of engraving, woodcutting, etching, aquatint, and lithography and the work of representative artists.

Prof. Wells

27.149 American Graphic Arts

4 Q.H.

Development of the graphic arts in America from the colonial times to the present as shown through the works of representative artists.

Not offered 1974-75

27.150 History of Photography

4 Q.H.

A concentrated study of the development of photography, with special emphasis on American photographic art to the present.

Prof. Holden

Fall and Winter Qtrs.

27.151 Modern Painting

4 Q.H.

Painting from the late 19th century to the present.

Prof. Wells

Spring Qtr.

27.152 Introduction to Art

4 Q.H.

A basic course in the characteristics of style, media, and techniques of painting, sculpture, graphic arts, architecture, and film art. Serves as a foundation for future study in art history.

Prof. Wells

Winter Qtr.

27.154 Italian Renaissance Art II

4 Q.H.

Italian painting and sculpture of the 16th and early 17th centuries.

Prof. Serenyi

Spring Qtr.

27.161 American Art I

4 Q.H.

Development of American architecture, sculpture and painting from colonial times.

Prof. Holden

Fall Qtr.

27.162 American Art II

4 Q.H.

American architecture, sculpture and painting from 1860 to the present.

Prof. Holden

27.171 Ancient Architecture

4 Q.H.

The architecture of Egypt, Greece, and Rome.

27.172 Medieval and Renaissance Architecture

4 Q.H.

Romanesque, Gothic, and Renaissance architecture.

27.173 Modern Architecture I

4 Q.H.

A study of architecture and city planning from 1850 to 1920.

Prof. Serenyi

27.174 Modern Architecture II

4 Q.H.

The great figures and the chief movements of 20th-century architecture and city planning.

Prof. Serenyi

Spring Qtr.

27.175 Late 19th-Century American Architecture

4 Q.H.

A survey of the Stick and Shingle Architectural Styles, as well as more general developments. Introductory lectures are followed by student presentations on selected topics.

Prof. Holden

27.176 Contemporary Architecture

4 Q.H.

Architecture and city planning since World War II, with special emphasis on their forms, theories, and social implications.

Prof. Serenyi

Not offered 1974-75

27.177 History of Architecture

4 Q.H.

A survey of the stylistic characteristics of architecture from ancient periods to the present.

Prof. Holden

27.181 Oriental Art I

4 Q.H.

The prehistoric arts of India, China, and Japan; the rise and spread of international Buddhist art; the national Indian styles of sculpture, architecture, and painting.

Not offered 1974-75

27.182 Oriental Art II

4 Q.H.

National styles of painting, sculpture, architecture, ceramics, and printmaking in China, Korea, and Japan.

Not offered 1974-75

27.183 Seminar in Modern Art and Architecture

(Prereq. One course in art history since the Renaissance) 4 Q.H.

Selected topics in modern art and architecture.

Prof. Serenyi

Not offered 1974-75

27.184 Graphic Arts I-Woodcutting

4 Q.H.

Creative print making utilizing the media of woodcutting.

Fall, Winter, and Spring Qtrs.

27.185 Graphic Arts II-Silkscreen

4 Q.H.

Creative print making utilizing the media of silkscreen.

Not offered 1974-75

27.186 Documentary Film

4 Q.H.

Study of the esthetics and tradition of the documentary film, with a major emphasis on contemporary directions.

Prof. Bishop

Fall and Winter Qtrs.

27.295, 27.296, 27.297 Honors Program

(each) 4 Q.H.

Staff

Winter and Spring Qtrs.

27.291, 27.292, 27.293 Directed Study

(each) 4 Q.H.

Independent work under the direction of members of the Department on a chosen topic. Limited to qualified Junior and Senior students majoring in art history with approval of the Department.

Music

28.100 Music I

4 Q.H.

Introduction to selected works of our musical heritage from earliest times to contemporary styles. Primarily a survey and listening course, with emphasis on styles, basic theory, forms, and the historical, social, and artistic periods which these works represent.

Staff

Fall, Winter, and Spring Qtrs.

28.101 Music II

(Prereq. 28.100, 28.102, 28.106) 4 Q.H.

An in-depth continuation of 28.100 aimed at the further development of appreciation and understanding of selected works of our musical heritage. The course consists of a detailed study of these works and their relationships to the artistic milieu in which they are created.

Prof. C. Norvish and Sonnenschein

Spring Qtr.

28.102 Learning to Read and Write Music

4 Q.H.

A basic course for those who have wanted to know how to read a score, or how to write a tune. Students will learn to read music at sight, and to compose in some of the basic forms (song, theme and variation, etc.).

Fall, Winter, and Spring Qtrs.

28.106 Theory I, Tonal Techniques I

4 Q.H.

Essentials of tonal technique: fundamentals, ear training, sight singing, and dictation.

Prof. Keaney

Fall and Winter Qtrs.

28.107 Theory II, Tonal Techniques B

(Prereq. 28.100, 28.102, 28.106) 4 Q.H.

Advanced ear training, sight singing, dictation, and musical analysis; harmonic principles of chords and their inversions.

Prof. Keaney

Spring Qtr.

28.112 Music of the Baroque

4 Q.H.

The period of the emergence of the orchestra, the chorus and the virtuoso performer; the development of the Oratorio, Opera, Concerto, and Symphony in the works of such composers as Monteverdi, Corelli, Handel, Vivaldi, and J.S. Bach.

Fall and Winter Qtrs.

28.113 Bach

4 Q.H.

The genius who summed up the Baroque era. A study of the man whose every note reflected his profoundly humanistic approach to religion. Works include large choral masterpieces such as the *St. Matthew Passion*, the *Brandenburg Concertos*, the *Well Tempered Clavier* and the *Suites*.

28.115 Music of the Classical Era

4 Q.H.

That which is classical concentrates on lasting values like form, balance and perfection of detail. Classical music therefore has values which make it meaningful in any period of history. Classicism reached its peak in the latter part of the 18th century with Mozart and Haydn whose vocal and instrumental works will be studied in detail.

Spring Qtr.

28.116 Great Literature for Keyboard Instruments

4 Q.H.

The study of music for clavichord, harpsichord, organ, pianoforte and synthesizer from the 16th century to the present. Emphasis will be on the evolution of literature for the keyboard.

28.117 Medieval and Renaissance

4 Q.H.

The development of sacred and secular monohony, vocal and instrumental works, and of polyphonic music from its beginning to about 1600.

28.119 Since Webern: The Avant-Garde

4 Q.H.

The avant-garde in music; total serialism, musique concrete, electronic music, chance music. The avant-garde in jazz, folk, rock, and pop.

28.120 Survey of Music History

4 Q.H.

A chronological view of Western music and the men who shaped its course. Selected works which demonstrate the trends in each period will be listened to and discussed with a view to style, continuity, and change. Among the composers whose works will be studied are Machaut, Josquin, Byrd, Bach, Mozart, Beethoven, Berlioz, Wagner, Mahler, and Stravinsky.

Fall and Winter Qtrs.

28.123 Music of the Romantic Era

4 Q.H.

Romantic realism and idealism in the 19th century. Emphasis is placed on historical, nationalistic, and literary influences in music. Composers studied include: Beethoven, Schumann, Schubert, Berlioz, Liszt, Chopin, Verdi, Wagner, Brahms, Tchaikovsky, and Mahler.

Prof. Silverman and Snyder

Fall, Winter, and Spring Qtrs.

28.124 Traditional Folk Music of the Western World

4 Q.H.

The folk music of Europe, Africa, North and South America, Asia, and Australia. The ethnic music, dances, traditions, epics, and sagas that have influenced Western and Eastern cultures.

28.125 Great Choral Literature

4 Q.H.

Analysis of sacred and secular choral literature from medieval to contemporary times.

Mr. Jacobson

Fall and Winter Qtrs.

28.126 Music as a Means of Social Expression

4 Q.H.

Deals with the artist's involvement with recurring social themes of man's view of himself, his search for brotherhood, his relation to minority groups and his sexual relationships. Paintings and literary works are used in addition to works by Beethoven, Schoenberg, Britten, and jazz composers.

Fall, Winter, and Spring Qtrs.

28.127 Musical Revolutionary Groups

4 Q.H.

Deals with the various movements that dared to overthrow the existing musical establishment. These groups include the Florentine "Camerata," The Russian "Five," the French "Six," the Second Viennese School, and the American MT Kisco "Kids."

28.128 Post Romanticism in Music

4 Q.H.

The consumation of 19th-century Romanticism and the forerunners of 20th-century Expressionism as seen in the works of Mahler, Bruckner, Strauss, and others.

28.129 Great Love Songs through the Ages

4 Q.H.

The music of love songs, ballads, chansons, lieder, and opera arias from the Middle Ages to today will be studied, listened to and discussed.

Fall and Winter Qtrs.

28.131 Musical Instruments in Western Culture

4 Q.H.

The evolution of musical instruments from the Middle Ages to today. General principles of instrument construction and the historical contexts of their use through the ages will be discussed. The evolution of changing tastes in instrumental sound will be illustrated through listening to recordings and whenever possible through live performance. Field trips to the Boston Museum of Fine Arts (which houses an excellent early instrument collection), and to various instrument builders in the Boston area will help to give the student a first-hand view of some ancient and some modern instruments.

28.135 Music of the U.S.A.

4 Q.H.

American music from Puritan psalm singing to the present time. Folk music of ethnic origin, concert music, ragtime, jazz, and contemporary styles are discussed.

28.136 Music in Popular Culture

4 Q.H.

Emphasis on the 20th century, especially the last 20 years. Thought is given to various subcultures as seen in folk, jazz, rock, and soul. Reference is made to popular music of other countries.

Prof. Tesson

Fall, Winter, and Spring Qtrs.

28.138 Nationalism in Music

4 Q.H.

Music in the service of the emerging states. Among the composers studied are: The Russian Five, Smetana and Dvorak of Bohemia, Sibelius of Finland, Grieg of Norway, Gade of Sweden, Liszt and Bartok of Hungary, Gottschalk, MacDowell and Ives of the United States.

28.139 The Music of Non-Western Societies

4 Q.H.

A survey of the music of African, southeast Asian, Indian, and near Eastern societies and the social and spiritual functions of music in these cultures.

28.140 Mozart

4 Q.H.

A musical development from child prodigy to mature artist is traced from his own letters and from biographies. Many of his major works, including opera, symphonies, concertos, and chamber music, are analyzed in detail.

28.141 20th-Century Music: Debussy to Schoenberg

4 Q.H.

The developments in music from 1900 to mid-century. Impressionism, Expressionism, Neo-Classicism, Post Romanticism, and Neo-Nationalism.

Prof. Haché

Fall and Winter Qtrs.

28.142 Stravinsky

4 Q.H.

Stravinsky: the man who ushered in the 20th century in music and lived to become a classic. His life and works: *Le Sacre*, *Petrouchka*, *Symphony of Psalms* and more recent works are given detailed attention. His contributions to 20th-century style—neo-classicism, pan diatonicism, additive style—are analyzed and his strong influence on other composers is noted.

28.145 Beethoven

4 Q.H.

An analysis of the complex personality and art of this major figure. His relation to the turbulent times in which he lived; his role in classical and romantic music.

Prof. Snyder

Fall and Winter Qtrs.

28.160 The Symphony

4 Q.H.

A study of the symphony as the major genre in the classical, romantic and contemporary periods. Works by Haydn, Mozart, Beethoven, Schumann, Tchaikovsky, Brahms, Sibelius, Prokofiev, and others are studied.

Profs. Sonnenschein and Nadeau

Fall, Winter, and Spring Qtrs.

28.180 Introduction to Opera

4 Q.H.

Analysis of opera as a dramatic form. Aria, recitative, ensemble, and other basic elements of opera are isolated and discussed. Numbers Opera, Music Drama, and Singspiel are some of the types of opera considered. Composers whose works are analyzed include Mozart, Wagner, Verdi, and Puccini.

Prof. Snyder

Fall and Winter Qtrs.

28.181 Contemporary Opera

4 Q.H.

Almost every major composer including Schoenberg, Berg, Bartok, Stravinsky, Hindemith, and Poulenc have contributed to the opera repertory, thus illustrating 20th-century style. Among the works studied are: *Wozzeck*, *The Rake's Progress*, *Dialogue of the Carmelites*, and *Bluebeard's Castle*.

Spring Qtr.

28.182 Wagner's Ring Cycle

4 Q.H.

An in-depth study of Wagner's Cycle of music drama; *Das Rheingold*, *Walkure*, *Siegfried*, *Gotterdammerung*, Wagner's compositional techniques (e.g., the use of leitmotif and musical metaphor) is examined in detail.

28.195 Directed Study

4 Q.H.

Independent work in a selected musical area under the direction of members of the department. Limited to qualified students with the approval of the department chairman, and only by special arrangements with the supervising faculty member.

28.200 Jazz

4 Q.H.

Jazz from its origins in New Orleans to the avant-garde experiments of today. The rhythmic, harmonic, instrumental, and stylistic characteristics of jazz are analyzed. Attention is given to the works of creative jazz artists such as Armstrong, Beiderbecke, Parker, Ellington, and Coltrane.

Fall and Winter Qtrs.

28.201 The New Jazz

4 Q.H.

An in-depth study of various recorded works of important jazz performers/composers with respect to their work as creative artists: Armstrong, Beiderbecke, Ellington, Coltrane, Miles Davis, etc. The study is not chronological but deals with the dynamics of artistic growth and change. Special attention is given to the developments of the last decade: Third Stream, Free Jazz, Eastern influences, electronic instruments, etc.

Spring Qtr.

28.202 Black Artist in Music

4 Q.H.

A study of the contributions of black composers and performers to the world of music.

Prof. Mitchell

Spring Qtr.

28.230 Musical Performance I

(Prereq. Audition or permission of instructor) 1 Q.H.

Participation in rehearsals and public performances and/or research, composition, arrang-

ing, conducting, solo and ensemble activity, etc., with the Chamber Orchestra, the Early Music Players, the N.U. Chorus, the N.U. Bands, or other ensembles, under the supervision and coaching of a faculty member of the Music Department. The student's progress will be evaluated at the end of the quarter by audition or otherwise.

28.231 Musical Performance II 1 Q.H.

28.232 Musical Performance III 1 Q.H.

28.233 Musical Performance IV 1 Q.H.

(Continuations of 28.230)

28.240 Piano Class I (Personalized System of Instruction [P.S.I.]

(Prereq. 28.240) 4 Q.H.

Designed to teach functional piano in a modern electronic piano laboratory on a P.S.I. basis. Keyboard harmony and aspects of tonal memory. A major objective of this course is the development of a progressive keyboard repertoire.

28.250 Music as a Listening Experience 4 Q.H.

This introduction-to-music course is listening-oriented and has been designed to provide tools for the aural appreciation of music. No previous musical knowledge is required or assumed, and the studies deal directly with compositions selected from the masterpieces of music. Organized according to the tenets of P.S.I. (Personalized System of Instruction), the student studies at his own pace under the constant guidance and supervision of the instructor. Grades are determined by the number of units completed and peer-tutor assistance is provided.

28.260 Methods of Developing Recreational Music 4 Q.H.

Students will be instructed in methods of evaluating musical needs and providing these needs to different settings. Methods will be developed in areas such as concert activities (jazz, folk and classical), group activities (choral singing, folk singing and dancing, etc.), and social recreation.

Spring Qtr.

93.160 American Musical Theatre

4 Q.H.

An interdisciplinary course, taught by the departments of Drama and Music. The development of the American musical, from *The Black Crook* to *Hair* and *Jesus Christ Superstar*, as an entertainment and as a serious art-form, through an examination of script, score, dance, and design. Works by Bernstein, Rodgers and Hammerstein, the Gershwins, Weill, Lerner and Loewe, and Cole Porter are examined. Guest lecturers, recordings, films, live productions supplement the course.

Profs. Blackman and Silverman

Fall and Winter Qtrs.

93.163 Spain's Golden Age in Music and Literature (1550-1681)

4 Q.H.

An interdisciplinary course, taught by the departments of Music and Modern Languages. Vocal and instrumental music from the cantigas of Sancta Maria to the musicodramatic forms of Lope de Vega. A study of great literary works including those of Cervantes, Calderon and Lope de Vega.

Profs. Keaney and Kitchin

Spring Qtr.

Drama and Speech

29.100 Public Speaking

3 Q.H.

A participation course for students interested in acquiring skills and experience in public communication. Emphasis on conversational delivery, organization, and audience analysis.

Staff

Spring Qtr.

29.101 Public Speaking

(Prereq. 29.100) 3 Q.H.

Speech patterns which involve effective discussion; analysis, evidence, and reasoning as factors in convincing and persuading people.

Staff

Not offered 1974-75

29.102 Effective Speaking

3 Q.H.

The study of verbal and nonverbal features of communicative and expressive utterance. Consideration of principles and methods of effective communication in the preparation and delivery of various types of speeches.

Staff

Fall and Winter Qtrs.

29.105 Argumentation and Debate

(Prereq. 29.100 or 29.102 or consent of instructor) 4 Q.H.

Argumentation and debate presented as techniques of a free society, bringing reasoned discourse to bear on personal and social problems for purposes of decision and action. Attention is given to the various forms of debating technique.

Prof. Woodnick

Not offered 1974-75

29.106 Speech Fundamentals

3 Q.H.

An overview of speech communication, examining areas of voice and articulation, oral interpretation, and public speaking.

Staff

Fall and Winter Qtrs.

29.107 Interpersonal Communications

4 Q.H.

Ways of becoming more aware of self and one's relation to others. An exploration of various options for communicating and increasing one's knowledge of group process.

Profs. Woodnick and Rothbard

Fall and Winter Qtrs.

29.108 Business and Professional Speaking

4 Q.H.

Practice on oral presentations, group communication, conference and discussion techniques, interview methods, and occasion speaking. The course combines performance aspects with case study methods of communication on the professional level.

Profs. Woodnick and Eastman

All Qtrs.

29.109 Speech for the Theatre

(Prereq. 29.110) 4 Q.H.

Special speech problems confronting actors performing in classical and contemporary theatre.

Ms. Sankus

Winter Qtr.

29.110 Voice and Articulation

4 Q.H.

The study of voice technique: emphasis on pitch, projection, articulation, and vocal variety. A combination of theory and practical application.

Profs. Woodnick and Eastman, Ms. Littlefield and Ms. Sankus

All Qtrs.

29.111 Oral Interpretation

4 Q.H.

Application of basic vocal techniques to the dramatic reading of prose, poetry, and drama. Through literary analysis the author's meaning is understood and, by means of oral reading skills, communicated to an audience.

Prof. Eastman

Fall and Winter Qtrs.

29.112 Advanced Voice and Articulation (Prereq. 29.110 or consent of instructor) 4 Q.H.

Development and application of vocal technique acquired in 29.110. Emphasis on vocal analysis, flexibility, regional patterns of speech.

Prof. Woodnick

Spring and Summer Qtrs.

29.113 Effective Speaking Workshop

1 Q.H.

Communication through individual speaking and small group conferences.

Staff

Spring and Summer Qtrs.

29.114 Advanced Oral Interpretation

(Prereq. 29.111) 4 Q.H.

Further development of oral reading skills acquired in 29.111. In addition, the course includes work with accents and dialects, study of reader's theatre, and an investigation of classical and modern philosophies of the art.

Prof. Eastman

Spring Qtr.

29.115 Theories of Persuasion

4 Q.H.

Persuasive discourse as it effects and refutes the process of dynamic social change; approaching critically the theories of persuasion derived from historical, philosophical, and

psychological sources and their application to contemporary problems of politicking, mass media, and advertising as they influence attitude, opinion, and action.

Prof. Rothbard

Fall and Winter Qtrs.

29.116 Persuasive Techniques

(Prereq. 29.115) 4 Q.H.

Application of the principles of persuasion to preparation and delivery of speeches and to critical analysis of modes of persuasion in representative speeches.

Prof. Rothbard

Spring Qtr.

29.117 Group Discussion

4 Q.H.

Focus on the task-oriented group; development of skills in decision-making, problem-solving, membership, and leadership. Both the content and the process are discussed and analyzed.

Prof. Rothbard

Fall and Winter Qtrs.

29.118 Speech Communication in Education

4 Q.H.

Through lectures, discussions, and performance projects an investigation is made of several activities. They are: conference and discussion techniques, both in decision-making situations and as teaching techniques; personal interviews, collective bargaining, and various speech situations involving the teacher's several audiences.

Prof. Eastman

Fall and Winter Qtrs.

29.119 Explorations in Communication

4 Q.H.

Designed to provide basic knowledge and understanding of the processes involved in the transference of meanings. An analysis of contemporary concepts of human communication. Projects in examining cases of communication breakdowns, feedback systems, problems of modern channels, and sender-receiver analyses.

Ms. Littlefield

Fall and Winter Qtrs.

29.120 Introduction to Theatre Arts (*For non-Drama majors*)

4 Q.H.

A brief view of the historical development of acting, directing, and production design. Emphasis on appreciation of contemporary theatrical forms.

Ms. Sankus

All Qtrs.

29.121 Survey of the Theatre I

4 Q.H.

Introduction to the drama as a dynamic medium of human expression; historical development of the theatrical form. Reading and analysis of selected plays as they relate to form, genre and style from the viewpoint of audience and artist.

Ms. Sankus and Ms. Lineberger

Fall and Winter Qtrs.

29.122 Survey of the Theatre II

4 Q.H.

Introduction to the theatre as a collaborative art form (theoretical and practical), with an emphasis upon acting, directing, designing, lighting, and the necessities of theatre economics.

Ms. Sankus and Ms. Lineberger

Winter and Spring Qtrs.

29.123 Propaganda

(Prereq. 29.115 or 29.119) 4 Q.H.

A descriptive and analytical survey of propaganda techniques and devices used in a conscious attempt to manipulate and ultimately control behavior.

Prof. Rothbard

Not offered 1974-75

29.127 The Mass and the Media

4 Q.H.

An exploration of the many media through which man expresses himself: i.e., music, art, film, radio, television, theatre, graffiti. Supplementing the course are lectures, films, and attendance at various productions.

Prof. Woodnick

Fall and Winter Qtrs.

29.128 Contemporary Public Address

4 Q.H.

A critical study of the public address of leading contemporary speakers representative of important political and social movements.

Staff

Spring and Summer Qtrs.

29.129 Introduction to Communication Skills

4 Q.H.

A survey course in the area of speech communication: concepts will be presented and

experiences provided in the areas of Public Address, Group Discussion, Voice, and Oral Interpretation.

Staff

Winter and Summer Qtrs.

29.130 Makeup

4 Q.H.

The principles of, the reasons for, and the materials used in makeup for the theatre, television, and films. The practical application of types and styles of makeup: straight, old-age, character, and corrective.

Winter Qtr.

29.135 Twentieth-Century European Theatre

4 Q.H.

The work of major European directors and designers who have attempted to develop viable alternatives to 19th-century realism. Exploration of the ideas and productions of such persons as Meyerhold, Brecht, Artaud, Grotowski, Vakhtangov, Piscator, Brook, Svoboda. Prof. Phillips

Fall Qtr.

29.136 The Theatre of Expanding Consciousness

4 Q.H.

The avant-garde theatre and its background in the other arts as well as in society. Both the historical development of the avant-garde as well as some of its major themes are explored. An attempt to provide the student with the necessary background for discovering enjoyment and meaning in today's emerging theatre.

Prof. Phillips

Winter Qtr.

29.150 Elementary Acting I

(Prereq. Drama major or consent of instructor) 4 Q.H.

Fundamental techniques of stage use. The actor and his stage environment. Improvisations for strengthening imagination and increasing freedom. Analysis of scripts for work on performed scenes.

Prof. Kaplan

Fall and Winter Qtrs.

29.151 Elementary Acting II

(Prereq. 29.150) 4 Q.H.

Fundamental analysis of the script, including physicalizations and vocal scoring; character analysis; scenes performed for classroom analysis.

Prof. Kaplan

Spring Qtr.

29.152 Intermediate Acting III

(Prereq. 29.151) 4 Q.H.

Further development of the actor's tools, script and character scoring, exercises for physical and psychological freedom. In-class scenes as works-in-progress.

Prof. Kaplan

Spring Qtr.

29.156 Stage and Body Movement

(Prereq. Drama major or permission of instructor) 4 Q.H.

A workshop course in movement and improvisation techniques which explore inner resources and allow the actor greater freedom of expression on the stage; analysis of various physical styles used on stage.

Ms. Sankus

Spring Qtr.

29.160 Concepts of Direction (Prereq. Drama major or permission of instructor) 4 Q.H.

Theories of dramatic presentation through analysis of selected historical developments. Purposes and techniques of theatrical direction as they relate to script analysis, production style, pictorial composition, rhythmic evolution, emphatic responses.

Prof. Blackman

Winter Qtr.

29.161 Problems in Direction

4 Q.H.

Experimentation in theory related to the staging of classical and modern drama. Analysis of plays for actual production; casting, rehearsals, character interpretations. Each student is responsible for the production of a one-act play.

Prof. Blackman

Spring Qtr.

29.163 Play Production

4 Q.H.

The basics of play production for recreation and education leaders in schools, camps, or settlement houses. Both formal and informal dramatics activities are explored, along with the

problems involved in preparing the creative, performing, design, and technical aspects of a production.

Prof. Bailey

Fall and Winter Qtrs.

29.164, 29.165, 29.166, 29.167 Practicum in Play Production

(each) 1 Q.H.

Laboratory practice in technical theatre: scene building and painting, and the performing of backstage functions. To be repeated for credit up to four credits.

Prof. Bailey

All Qtrs.

29.170 Scenic Production

4 Q.H.

Principles which underlie the coordination and execution of scenery for the stage; examination of different kinds of scenery, tools, equipment, construction materials, and techniques; handling of scenery and basic scene painting. Laboratory work: constructing and painting scenery for University productions.

Prof. Bailey

Fall and Winter Qtrs.

29.171 Design and Lighting

(Prereq. 29.170) 4 Q.H.

The basic principles of design and lighting for the stage; historical analysis of composition and design from classical to modern periods; execution of designs for productions.

Prof. Bailey

Not offered 1974-75

29.172 Scenic Design for the Stage

(Prereq. 29.170) 4 Q.H.

Practical problems of scene design and methods of approach. Classwork and projects in analysis of a script in terms of visual requirements; elements of design and their application to scenery; methods of inspiration; presentation of ideas including sketches, renderings, models, working drawings, and elevations; basic scene painting and evaluation of designs. Laboratory work includes designing and executing scenery for University productions.

Prof. Bailey

Spring Qtr.

29.173 Lighting Design for the Stage

(Prereq. 29.170) 4 Q.H.

Basic principles and practices of stage lighting, including the qualities and functions of light, lighting instruments and controls, basic electricity, color in light, and analysis of the script in terms of light requirements. Students develop light plots and schedules for various kinds of stage productions, and frequently design University productions. Class work includes laboratory work on lighting crews for University productions.

Prof. Bailey

Spring Qtr.

29.174 Scene Painting

4 Q.H.

The history of scene painting and ornament from classical to contemporary times. Studio organization, color, color theory, equipment, tools, materials, and costs involved with painting stage scenery. Projects and exercises in the use of different media, matching colors, painting of textures, light and shade, and the use of stencils and physical textures. Laboratory sessions include painting stage scenery for University productions.

Prof. Bailey

Not offered 1974-75

29.175 Costuming for the Stage

4 Q.H.

The theoretical and practical aspects of costuming are covered through a combined lecture/laboratory format. Basic design concepts, techniques of rendering costume plates, pattern drafting, draping, fabric usage, and special effects. Particular emphasis is given to problems of costuming for high school and college theatres.

Ms. Lineberger

Fall Qtr.

29.176 Historic Costume and Design

(Prereq. 29.175) 4 Q.H.

A survey of historic costume and civil dress through the ages of Western man. Its adaptation and relevance to the problems involved in designing for high school and college stages are the foundation for this area of study. Emphasis is on the use of research sources for design assignments within various periods.

Ms. Lineberger

Spring Qtr.

29.180 Playwriting

4 Q.H.

The principles and practices of modern dramatic composition: characterization, plot, plot

structure, dialogue, and other dramaturgical elements as seen in the one-act play. The writing of brief scenes; the dramatic composition; and the one-act play.

Prof. Phillips

Fall and Winter Qtrs.

29.185 Children's Theatre

4 Q.H.

Theories and methods of relating creative techniques to children's programs in schools, churches, and recreational facilities. Analysis of literature in preparation for production of children's plays.

Prof. Blackman

Spring and Summer Qtrs.

29.186 Educational Theatre

4 Q.H.

Drama and drama activities in community, social, health, and educational agencies. Organizing and directing young people's theatre programs.

Not offered 1974-75

29.200 History of the Theatre

4 Q.H.

Development of the theatre and the drama of Greece and Rome, medieval Europe, Elizabethan and Restoration England, and 17th-century France; an examination of playwriting, acting styles, scene design, theatre architecture, and the relationship among these elements.

Prof. Phillips

Fall and Winter Qtrs.

29.201 History of the Theatre

4 Q.H.

Development of the European theatre of the 18th, 19th, and early 20th centuries; growth and development of the proscenium theatre; the emphasis upon naturalistic and realistic presentation; theatre innovations.

Prof. Phillips

Spring and Summer Qtrs.

29.202 The Classic Theatre of Greece and Rome

4 Q.H.

The beginnings of theatre and its growth as a potent institution and art form. A detailed study of the interrelation of the dramatic form, theatre structure, and works of major playwrights.

Not offered 1974-75

29.205 The Restoration Theatre

4 Q.H.

The philosophical, social, historical, and critical influences upon the Restoration theatre and its dramatists.

Not offered 1974-75

29.210 The American Theatre

4 Q.H.

The American theatre from the Revolutionary War to the present.

Prof. Phillips

Fall and Winter Qtrs.

29.211 The Theatre of Williams, Miller, and Albee

4 Q.H.

An intensive study of the works of three major post-World War II American playwrights.

Prof. Phillips

Spring and Summer Qtrs.

29.230 Contemporary Theatre

4 Q.H.

The various forces that have shaped the major trends in Western theatre over the past two decades. Emphasis upon selected works and contributions of Brecht, Bolt, Miller, Wilder, Baraka, Bullins, Horowitz, the major absurdists and present experimentalists; as well as examinations of contemporary theatrical concerns with nudity, obscenity, homosexuality and the special economic and artistic formulators of the plays we see.

Prof. Kaplan

Fall and Winter Qtrs.

29.231 The Theatre of the Absurd

4 Q.H.

The Theatre of the Absurd as an anti-literary reflection of and reaction to life; its effects upon Western drama. Major concern with selected works and ideas of Jarry, Artaud, Camus, Sartre, Beckett, Genet, Ionesco, Pinter, Kopit, Brown, and Arrabal.

Prof. Kaplan

Summer Qtr.

29.240 Drama Criticism

4 Q.H.

An examination of both the major historical statements of drama theory and contemporary

drama criticism as evidenced in journalistic play reviews. Students prepare reviews of local productions.

Prof. Phillips

Spring Qtr.

29.290 Directed Study

Staff

4 Q.H.

All Qtrs.

93.160 American Musical Theatre

4 Q.H.

An interdisciplinary course, taught by the departments of Drama and Music. The development of the American musical, from the *Black Crook* to *Hair* and *Jesus Christ Superstar*, as an entertainment and as a serious art-form, through an examination of script, score, dance, and design. Works by Bernstein, Rodgers and Hammerstein, the Gershwins, Weill, Lerner and Loewe, and Cole Porter are examined. Guest lecturers, recordings, films, live productions supplement the course.

Profs. Blackman and Silverman

Fall and Winter Qtrs.

English

Prerequisite for all English courses is Freshman English (30.113 and 30.114) or equivalent.

30.104 Advanced Expository Writing

4 Q.H.

A practical course in writing direct prose with clarity and precision. Includes various methods of development; diction, style, tone; the article, review, and other forms.

Prof. Norvish

All Qtrs.

30.106 English for International Students I

4 Q.H.

Selected prose literature with a focus on descriptive, narrative, and expository techniques. Weekly papers will be aimed at broadening diction, syntax, and organizational techniques in addition to dealing with responses to form and content.

Mr. Biddle

30.107 English for International Students II

(Prereq. 30.106) 4 Q.H.

Selected poetry, drama, and short novels with a focus on major aspects of literary form, content, genre, figurative language, and prosody.

Mr. Biddle

30.108 Creative Writing: Poetry

4 Q.H.

Practice in various forms and strategies of verse, with specific assignments in different modes; discussion and criticism of student work and selected texts.

Mr. DeRoche

All Qtrs.

30.109 Creative Writing: Fiction

4 Q.H.

Conducted as an introduction to fiction writing, with emphasis on the short story. The course is open to students in all disciplines, whether or not they have previously written fiction. The minimum requirements are 10,000 words of original work divided into three assignments. Reading and discussion of manuscripts written by the students occupy the bulk of class time.

Mr. Sandberg

All Qtrs.

30.110 Literary Analysis: Poetry

4 Q.H.

Close reading of selected poems, mastery of critical terms, practice in varied critical approaches to poetry. A number of critical papers are written. Required of English majors.

Staff

Fall and Winter Qtrs.

30.111 Literary Analysis: Fiction

4 Q.H.

A formal study of selected novels and short stories, mastery of critical terms, practice in varied critical approaches. A number of critical papers required.

Staff

Spring and Summer Qtrs.

30.112 Literary Analysis: Drama

4 Q.H.

A formal study of selected plays, mastery of critical terms, practice in varied critical approaches. A number of critical papers required.

Staff

Spring and Summer Qtrs.

30.113 Freshman Writing

4 Q.H.

Important principles of logic and rhetoric applied to exposition and argumentation; review of sentence structure, punctuation, and paragraphing; extensive reading and analysis of the essay form; theme assignments.

Staff

All Qtrs.

30.114 Introduction to Literature

(Prereq. 30.113) 4 Q.H.

An introduction to literary forms: poetry, prose fiction, and drama. Intensive reading various forms and discussion of different approaches to literature.

Staff

All Qtrs.

30.115 Great Themes in Literature

(Prereq. 30.114) 4 Q.H.

Content determined by instructor, who chooses a theme and a number of books from different periods to illustrate it.

Staff

Winter and Spring Qtrs.

30.120 Introduction to Linguistics

4 Q.H.

Theories of the nature and origin of language; review of historical and comparative linguistics; differences between written and spoken language, prescriptive and descriptive grammars; structural and generative-transformational phonology, morphology, and syntax; distinctive features; current trends; investigation into dialectology and linguistic field work; methodology regarding unwritten languages.

Staff

Fall and Winter Qtrs.

30.121 Foundations of the English Language

4 Q.H.

Development of modern English from pre-Anglo Saxon beginnings; effects of Roman, Scandinavian, and Norman invasions; dialect geography; evolutionary changes, word formation and borrowing; English as an international language; origins of writing and problems of spelling.

Staff

Spring and Summer Qtrs.

30.124 Traditional Grammar

4 Q.H.

A reappraisal of traditional grammar in the light of recent advances in grammatical theory; the practical application of such grammar in both studying and teaching English as a medium of expression; supplementary readings by way of transition to the newer grammars.

Staff

Fall and Winter Qtrs.

30.125 Grammars of English

4 Q.H.

Designed for students seeking a comprehensive knowledge of English grammar, this course provides a study of structure and usage in English according to traditional, descriptive, and generative (transformational) approaches.

Prof. Fairley

Spring and Summer Qtrs.

30.126 Transformational Grammar

4 Q.H.

The development of the theories of generative-transformational grammars by Noam Chomsky and others, and the development of the skill to construct and operate specific generative-transformational grammars.

Prof. Fairley

Spring and Summer Qtrs.

30.130 Introduction to Semantics

4 Q.H.

The relation between language and behavior, levels of abstraction in communication, habits of evaluation of linguistic phenomena, and the modification of such habits in the direction of human understanding and survival.

Prof. Blois

Fall and Winter Qtrs.

30.140 The Novel of Violence

4 Q.H.

The hard-boiled tradition in American literature. Works by Fenimore Cooper, Owen Wister, Jack Scheafer, Ernest Hemingway, Dashiell Hammett, Raymond Chandler, and others are discussed in terms of their response to the conflict between the ideal of community and the ideal of individualism. Critical theories of D.H. Lawrence, R.W.B. Lewis, Leslie Fiedler, Leo Marx, A.N. Kaul, and others are considered.

Prof. Parker

Fall and Winter Qtrs.

30.141 Science Fiction

4 Q.H.

The myths and rhetorical (scientific and pseudo-scientific) strategies of science fiction from Mary Shelley's *Frankenstein* through current authors such as Vonnegut, Bradbury, Heinlein, Clarke.

Prof. Goshgarian

All Qtrs.

30.142 The Psychological Novel

4 Q.H.

Concentration on 20th-century novels whose themes stress individual behavior and motivation, and whose form and style often try to imitate human mental and emotional processes. Authors studied include: Kafka, Dostoevski, Faulkner, Conrad, and Lawrence.

Prof. Sullivan

Spring and Summer Qtrs.

30.143 Autobiography and Fiction

4 Q.H.

Autobiography as the product of creative and therefore fictional impulses is studied by examining the way autobiographers shape the facts of their lives into patterns reflecting attitudes toward self. This study is extended to novels narrated by fictional self-historians.

Prof. Roemer

Fall and Winter Qtrs.

30.144 Literature of the Absurd

4 Q.H.

The aesthetic structure and philosophical implications of such significant "absurdist" writers as Beckett, Genet, Vonnegut, Pynchon, and West.

Prof. Kroll

Fall and Winter Qtrs.

30.151 The Modern Novel

4 Q.H.

Outstanding novels of the 20th century, with emphasis on literary trends and implied social outlook.

Staff

Fall and Winter Qtrs.

30.152 Modern Drama

4 Q.H.

Native and European drama since 1880, with emphasis on the relationship between drama and society in the 20th century.

Staff

Spring and Summer Qtrs.

30.154 The Modern Short Story

4 Q.H.

Selected British and American writers of the short story, with close attention to contemporary practitioners (Salinger, Malamud, Roth) as well as to major figures (Joyce, Lawrence, Faulkner).

Staff

Fall and Winter Qtrs.

30.160 New Topics in Literature

4 Q.H.

This experimental course deals with a different topic each fall/winter and spring/summer, providing the opportunity for students to study unusual or nontraditional aspects of literature. Sample possibilities: Gothic and Horror Fiction, Victorian Children's Literature, and the Literature of Utopia. Topic will be preannounced.

Staff

Fall and Winter Qtrs.

30.161 New Topics in Literature

4 Q.H.

Not a continuation of 30.160, but the same course with a different topic.

Staff

Spring and Summer Qtrs.

30.162 Major Figure

4 Q.H.

Devoted entirely to the work of a single writer, with a different one each fall/winter and spring/summer: i.e., Wordsworth, Joyce, Tolstoy, Dickens. Subject will be preannounced.

Staff

Fall and Winter Qtrs.

30.163 Major Figure

4 Q.H.

Same as 30.162, but with a different writer.

Staff

Spring and Summer Qtrs.

30.170 Survey of English Literature

4 Q.H.

English literature to 1800.

Staff

Fall and Winter Qtrs.

30.171 Survey of English Literature

4 Q.H.

English literature from 1800 to the present.

Staff

Spring and Summer Qtrs.

30.180 Survey of American Literature

4 Q.H.

American literature to 1860.

Staff

Fall and Winter Qtrs.

30.181 Survey of American Literature

4 Q.H.

American literature from 1860 to the present.

Staff

Spring and Summer Qtrs.

30.182 Major American Novels

4 Q.H.

An intensive analysis of the themes, forms, and techniques of American novelists of the 19th and early 20th centuries. Critical papers are required.

Prof. Trachtenberg

Fall and Winter Qtrs.

30.183 Major American Novels

4 Q.H.

An intensive analysis of the themes, forms, and techniques of modern American novelists. Critical papers are required.

Prof. Trachtenberg

Spring and Summer Qtrs.

30.186 Early American Literature

4 Q.H.

The development of early American culture of the colonial and federal periods. Letters, narratives, verse, polemics, the Federalist Papers, etc.

Prof. Lesser

Fall and Winter Qtrs.

30.187 New England Renaissance

4 Q.H.

An intensive survey of transcendentalism, and relevant works of Melville and Hawthorne.

Profs. Morse and Griffin

Fall and Winter Qtrs.

30.188 American Romanticism

4 Q.H.

An intensive survey of Poe, Melville, Whitman, Dickinson, and others.

Profs. Morse and Griffin

Spring and Summer Qtrs.

30.189 American Realism

4 Q.H.

American literature from the Civil War to Norris, Crane, Twain, and James.

Prof. Nagel

Fall and Winter Qtrs.

30.190 Modern American Literature

4 Q.H.

Fiction, drama, and poetry from the turn of the century to the mid-forties.

Staff

Spring and Summer Qtrs.

30.200 Western World Literature I

4 Q.H.

The major literary forms of classical Greece, with special attention to the epic, drama, and dialogue. In-depth study of selected works of Homer, Plato, Aristotle, and the dramatists.

Prof. Blessington

Fall and Winter Qtrs.

30.201 Western World Literature II

4 Q.H.

The major literary forms of the Roman Empire, with special attention to the epic, drama, and oration. Emphasis on the works of Virgil, Horace, Ovid, and Cicero.

Prof. Blessington

Spring and Summer Qtrs.

30.202 Western World Literature III

4 Q.H.

The major literary forms in the European tradition from the medieval period to the 19th century. Selected readings from the writings of Dante, Calderon, Milton, Racine, Corneille, Johnson, and Goethe.

Prof. Sands

Fall and Winter Qtrs.

30.203 Western World Literature IV

4 Q.H.

The major literary forms of the 20th century. Readings from major American and European figures with special emphasis on Kafka, Camus, Sartre, Ionesco, Beckett, and Albee.

Prof. Sands

Spring and Summer Qtrs.

30.204 Practical Writing

4 Q.H.

Designed for people who wish to write professionally, but who are not primarily interested in writing fiction or poetry. Discussions on how to write and edit essays, advertisements, feature stories, articles, film strips, news stories, news releases, technical manuals, house organs, industrial films, direct mail, radio commercials. Guest lecturers from various professions appear from time to time.

Prof. Parker

All Qtrs.

30.209 Advanced Fiction Writing

(Prereq. 30.109 or permission of instructor) 4 Q.H.

Reading and discussion of student manuscripts (longer and more complex than those developed in 30.109, Creative Writing: Fiction).

Mr. McHale

All Qtrs.

30.210 Major British Novelists

4 Q.H.

The 18th-century English novel, with special attention to Defoe, Fielding, Smollett, Sterne, the Gothic novelists, and Austen; the development of the English novel and the characteristic quality of 18th-century fiction.

Prof. Sands

Fall and Winter Qtrs.

30.211 Major British Novelists

4 Q.H.

The 19th-century English novel, with special attention to the Brontes, Thackeray, Trollope, Eliot, Meredith, Gissing, and Hardy; the Victorian frame of mind as seen in the novels.

Staff

Spring and Summer Qtrs.

30.218 Medieval English Literature

4 Q.H.

Major works in Middle English: *Sir Gawain*, *Piers Plowman*, and *Pearl*.

Profs. Blanch and Kroll

Fall and Winter Qtrs.

30.219 Major British Dramatists: Restoration and 18th Century

4 Q.H.

Major dramatists from 1660—1800. Among those studied are: Etherege, Wycherley, Congreve, Dryden, Addison, Goldsmith, and Sheridan.

Staff

Spring and Summer Qtrs.

30.220 Major British Dramatists: Elizabethan and Jacobean

4 Q.H.

The origin, theme, form, technique, and poetry of such dramatists as Kyd, Webster, Tourneur, Fletcher, and Beaumont, with particular emphasis on the works of Marlowe, Jonson, and Ford.

Staff

Fall and Winter Qtrs.

30.221 Major British Dramatists: 19th Century and Modern

4 Q.H.

British drama with particular emphasis on the poetic and experimental in the works of Shaw, Synge, Yeats, O'Casey, Eliot, Behan, Pinter, and Beckett.

Prof. Bernstein

Fall and Winter Qtrs.

30.222 Chaucer

4 Q.H.

Selected *Canterbury Tales*.

Profs. Blanch and Kroll

Fall and Winter Qtrs.

30.223 Chaucer

4 Q.H.

Selected *Canterbury Tales* and Chaucer's early poems.

Profs. Blanch and Kroll

Spring and Summer Qtrs.

30.224 Spenser

4 Q.H.

Selected early poems and portions of the *Faerie Queene*.

Prof. Blessington

Spring and Summer Qtrs.

30.225 Milton

4 Q.H.

Concentration on Milton's *Paradise Lost*, with supplementary readings in his minor poems and prose.

Prof. Blessington

Fall and Winter Qtrs.

30.230 Seventeenth-Century English Literature

4 Q.H.

Major writers of the first half of the century, with special emphasis on Bacon, Jonson, and the

metaphysical poets, Donne and Herbert; the effect of science on the literature and the thinking of the times.

Prof. Howes

Fall and Winter Qtrs.

30.231 Seventeenth-Century English Literature

4 Q.H.

Major writers of the second half of the century, with emphasis upon Dryden and Milton. Satire as a literary genre and its relationship to the times.

Staff

Spring and Summer Qtrs.

30.236 Eighteenth-Century English Literature

4 Q.H.

Significant dramatic works of the period and the writings of Pope and Swift.

Prof. Weitzman

Fall and Winter Qtrs.

30.237 Eighteenth-Century English Literature

4 Q.H.

Writings of Dr. Johnson, Boswell, and Blake.

Prof. Weitzman

Spring and Summer Qtrs.

30.240 Nineteenth-Century English Literature: The Romantics I

4 Q.H.

The poetry of Blake, Wordsworth, Coleridge, and related critical material; the relationship between the poetry and the time.

Prof. Roemer

Fall and Winter Qtrs.

30.241 Early Victorian Literature, 1830-1870

4 Q.H.

Survey of the major literary forms of the period. Readings in Tennyson, Browning, Arnold, Carlyle, Mill, Ruskin, and Dickens.

Prof. Sussman

Fall and Winter Qtrs.

30.242 Nineteenth-Century English Literature: The Romantics II

4 Q.H.

The poetry of Byron, Shelley, Keats, and related critical material; the essays of Lamb, Hazlitt, and DeQuincey.

Prof. Roemer

Spring and Summer Qtrs.

30.243 Later Victorian Literature, 1870-1900

4 Q.H.

Emphasis on the movement toward "modernism" in the later 19th century. Readings in Pater, G.M. Hopkins, Wilde, Hardy, and the early work of G.B. Shaw and Conrad.

Prof. Sussman

Spring and Summer Qtrs.

30.246 Twentieth-Century Literature

4 Q.H.

The development of the British Novel from 1900 to 1920. Writers studied are: Conrad, Galsworthy, Bennet, Wells, Forster, Joyce, Lawrence, and Ford.

Prof. Roby

Fall and Winter Qtrs.

30.247 Twentieth-Century Literature

4 Q.H.

The development of the British novel from 1920 to the present. Writers to be studied are: Woolf, Orwell, Beckett, Cary, Amis, Snow, Murdoch, and Fowles.

Prof. Roby

Fall and Winter Qtrs.

30.248 Sixteenth Century-English Literature

4 Q.H.

Fall and Winter Qtrs.

30.250 Shakespeare

4 Q.H.

A chronological approach to Shakespeare's plays, beginning with *Romeo and Juliet* and ending with *Julius Caesar*. Emphasis on diction, dramatic structure, and psychology.

Profs. Howes and Westlund

Fall and Winter Qtrs.

30.251 Shakespeare

4 Q.H.

Shakespeare's middle and last phases (*Hamlet* to *The Tempest*); selected plays.

Profs. Howes and Westlund

Spring and Summer Qtrs.

30.260 The Bible

4 Q.H.

A close study and textual analysis of selected books of the Bible. The assigned texts are especially considered in their historical and literary aspects.

Prof. Blois

Spring and Summer Qtrs.

30.261 Mythology

4 Q.H.

The mythological patterning of human experience; the philological and anthropological

approaches to specific myths, especially those of the Greeks; and the themes of sacrifice and change.

Prof. Blois

Fall and Winter Qtrs.

30.262 Literary Criticism: Approaches to Literature

4 Q.H.

Exercises and readings in ancient and modern theories of literature. Included are: Marxist, Freudian, Jungian and New Critical theories, as well as selections from Plato, Aristotle and the Romantics.

Prof. Nelson

Fall and Winter Qtrs.

30.263 Modern Poetry I

4 Q.H.

A study of the origin and development of modern poetry. Poets studied are: Hardy, Yeats, Robinson, Frost, Stevens, Moore, Eliot, and Pound. Recommended for students who have already had an introductory course in poetry.

Prof. Morse

Fall and Winter Qtrs.

30.264 Modern Poetry II

4 Q.H.

A continuation of 30.263, with emphasis on the later work of Eliot and Pound, William Carlos Williams, the Objectivists, the Fugitives (Ransom, Tate, Warren), Auden, Lowell, Roethke, Dylan Thomas, and the "new poets" from 1945 to 1960.

Prof. Morse

Spring and Summer Qtrs.

30.266 Literary Criticism: Myth and Archetypal

4 Q.H.

Exercises and readings in selected schools of myth and archetypal literary criticism.

Prof. Nelson

Spring and Summer Qtrs.

30.267 Afro-American Literature

4 Q.H.

A survey of the development and range of black American writers, emphasizing poetry and prose from the post-Civil War period to the present.

Mr. Hurreh

Fall and Winter Qtrs.

30.268 Afro-American Literature

4 Q.H.

Continuation of 30.267.

Mr. Hurreh

Spring and Summer Qtrs.

30.269 The Black Novel

4 Q.H.

A study of the black novel—its theme, structure, and style—and its historical, cultural, and literary importance.

Ms. McKay

Fall and Winter Qtrs.

30.270, 30.271 Junior Seminar

(each) 4 Q.H.

Fall, Winter, and Spring Qtrs.

30.272 Studies in English Literature

4 Q.H.

A seminar course on a special topic which is announced in advance. Examples: The Pre-Raphaelites, Literature and Psychology, and John Donne.

Staff

Fall and Winter Qtrs.

30.273 Studies in English Literature

4 Q.H.

Continuation of 30.272.

Staff

Spring and Summer Qtrs.

30.274 Studies in American Literature I

4 Q.H.

A seminar course on a special topic announced in advance. Examples: Puritanism, Early Drama, and The Genteel Tradition.

Staff

Fall and Winter Qtrs.

30.275 Studies in American Literature II

4 Q.H.

Continuation of 30.274.

Staff

Spring and Summer Qtrs.

30.276 African Literature

4 Q.H.

An in-depth study of African writers such as Achebe, Armah, Laye, and Fanon.

Mr. Hurreh

Fall and Winter Qtrs.

30.280, 30.281 Senior Seminar

Staff

(each) 4 Q.H.
Fall, Winter, and Spring Qtrs.**30.290, 30.291 Directed Study**(each) 4 Q.H.
All Qtrs.**30.295, 30.296 Junior Honors**(each) 4 Q.H.
All Qtrs.**30.297, 30.298 Senior Honors**(each) 4 Q.H.
All Qtrs.

French

Prerequisites listed for Modern Languages are based on current course numbers at Northeastern. Equivalent course work done elsewhere will be considered acceptable to satisfy these prerequisites.

31.201 Elementary French I

4 Q.H.

Essentials of grammar; practice in speaking and reading; progressive acquisition of basic language skills.

Prof. Williams and Staff

Fall and Winter Qtrs.

31.202 Elementary French II

(Prereq. 31.201) 4 Q.H.

Continuation of grammar study and basic language skills; reading of French of increasing difficulty; practice in conversation.

Prof. Williams and Staff

31.203 Intermediate French I

(Prereq. 31.202) 4 Q.H.

Continuation of grammar, oral practice, and the reading of selected texts.

Prof. Stephan and Staff

31.204 Intermediate French II

(Prereq. 31.203) 4 Q.H.

Prof. Stephan and Staff

31.205 Reading French in the Arts and Sciences

(Prereq. 31.202 or equiv.) 4 Q.H.

Designed for those students who wish to develop their reading skills, without regard to other aspects of the language such as speaking or writing. To this end, the grammar necessary for reading is stressed, together with vocabulary building. Scientific and nonscientific texts are read. This course is also very helpful for students, graduate and undergraduate, who need to pass a reading examination to fulfill specific degree requirements. However, it should be made clear that this course is not a substitute for 31.203 and 31.204 (Intermediate French).

Mr. Robinson

Fall and Winter Qtrs.

31.217 French Literature in Translation

4 Q.H.

An elective course for all students, offering a study of some of the most significant works of French literature in translation. The topic will vary from year to year. Language majors would receive major credit for this course *only* by making special arrangements with the instructor for extra work to be done.

Mr. Robinson

Spring and Summer Qtrs.

31.219 Cherchez la Femme! Women in French Literature of the 18th and 19th Centuries

4 Q.H.

A one-quarter course conducted in English of French literature in translation. An opportunity to see how woman is viewed by some of the great French novelists of the 18th and 19th centuries. The class meetings alternate between lectures and group discussions of literary, psychological and sociological issues raised by the texts. A reading knowledge of French is desirable, but *not* essential.

31.227 French Composition and Conversation I

(Prereq. 31.204) 4 Q.H.

Aiming at perfect speaking and writing ability: the basis of work is analysis of the language,

oral and written reports and general discussions. Conducted in French.

Prof. Cedrone and Staff

Fall and Winter Qtrs.

31.228 French Composition and Conversation II

(Prereq. 31.227) 4 Q.H.

Continuation of 31.227, with stress on individual work, free discussions, and compositions. Conducted in French.

Prof. Cedrone and Staff

Spring and Summer Qtrs.

31.231 Masterpieces of French Literature I

(Prereq. 31.204) 4 Q.H.

Introductory course in French literature. Selected works from the Middle Ages to the 18th century.

Prof. Gilman and Staff

Fall and Winter Qtrs.

31.232 Masterpieces of French Literature II

(Prereq. 31.204 or equiv.) 4 Q.H.

Introductory course in French literature. Selected works from the 19th and 20th centuries.

Prof. Gilman and Staff

Spring and Summer Qtrs.

31.233 Applied French Linguistics

(Prereq. 30.120) 4 Q.H.

For teachers or prospective teachers of French: phonemes and allophones, breath groups and sentences, intonation patterns, comparison between oral and written French.

Prof. Williams

31.243 French Classicism

(Prereq. 31.232 or equiv.) 4 Q.H.

Intellectual currents and other nondramatic literature of the 17th century.

Prof. Williams

Offered 1975-76

31.244 French Classicism

(Prereq. 31.232 or equiv.) 4 Q.H.

Dramatic literature of the 17th century. Plays of Corneille, Moliere, and Racine.

Prof. Williams

Offered 1975-76

31.245 French Literature of the 18th Century

(Prereq. 31.232 or equiv.) 4 Q.H.

The progress of the philosophical spirit and rationalistic thinking as reflected in the works of Fontenelle, Bayle, Montesquieu, Voltaire, and others.

Prof. Fabrizi

Fall and Winter Qtrs.

31.246 French Literature of the 18th Century

(Prereq. 31.232 or equiv.) 4 Q.H.

The achievements of the spirit of enlightenment and the awakening of the romantic sensibility, as seen in such authors as Diderot, Rousseau, St. Pierre, and Beaumarchais. Conducted in French.

Prof. Fabrizi

Spring and Summer Qtrs.

31.247 French Literature of the 19th Century

(Prereq. 31.232 or equiv.) 4 Q.H.

Romantic poetry and drama; the realist novel.

Prof. Stephan

Fall and Winter Qtrs.

31.248 French Literature of the 19th Century

(Prereq. 31.232 or equiv.) 4 Q.H.

Flaubert; Parnassian and Symbolist poetry.

Prof. Stephan

Spring and Summer Qtrs.

31.249 French Literature of the 20th Century

(Prereq. 31.232 or equiv.) 4 Q.H.

Narrative and dramatic prose writers prior to World War II, including Proust, Claudel, Gide, and Mauriac.

Prof. Fabrizi

Offered 1975-76

31.250 French Literature of the 20th Century

(Prereq. 31.232 or equiv.) 4 Q.H.

The prose literature of present-day France as illustrated by the works of Sartre, Camus, Ionesco, and others.

Prof. Fabrizi

Offered 1975-76

31.291, 31.292, 31.293, 31.294 Directed Study

(each) 4 Q.H.

Staff

All Qtrs.

31.295, 31.296, 31.297, 31.298 Honors Program

(each) 4 Q.H.

Staff

All Qtrs.

Spanish

Prerequisites listed for Modern Languages are based on current course numbers at Northeastern. Equivalent course work done elsewhere will be considered acceptable to satisfy these prerequisites.

32.201 Elementary Spanish I

4 Q.H.

Essentials of grammar; practice in pronunciation; progressive acquisition of a basic vocabulary and idiomatic expressions.

Prof. Kitchin and Staff

Fall and Winter Qtrs.

32.202 Elementary Spanish II

(Prereq. 32.201) 4 Q.H.

Continuation of grammar study. Oral and written exercises; reading of basic Spanish prose.

Prof. Kitchin

32.203 Intermediate Spanish I

(Prereq. 32.202) 4 Q.H.

Intensive grammar review. Reading of modern prose and poetry, with occasional oral or written translation. Basic elements of composition and conversation practice based on assigned readings.

Prof. Modee and Staff

32.204 Intermediate Spanish II

(Prereq. 32.203 or equiv.) 4 Q.H.

Intensive reading of modern Spanish prose and poetry of moderate difficulty. Further practice in composition and continued conversation practice based on assigned readings.

Prof. Modee and Staff

32.209 Conversational Spanish I (*Open to non-majors only*)

(Prereq. 32.204 or equiv.) 4 Q.H.

Emphasis on developing the student's ability to speak Spanish and to comprehend it. Ordinarily, the entering student will have completed 32.204, or the equivalent, but particularly able students may be accepted after having completed only 32.202. In this case, the sequence 32.209-210 may be used to satisfy the language requirement.

Mrs. Licis

Fall and Winter Qtrs.

32.210 Conversational Spanish II

(Prereq. 32.209 or equiv.) 4 Q.H.

Continuation of 32.209, with continuing emphasis on the development of oral facility in Spanish.

Mrs. Licis

Spring and Summer Qtrs.

32.211 Advanced Conversational Spanish (*Open to non-majors only*)

(Prereq. 32.210 or equiv.) 4 Q.H.

Continuation and more intensive practice of work begun in 32.210.

Mrs. Licis

32.213 Readings in Spanish Literature (*Open to non-majors only*)

(Prereq. 32.204 or equiv.) 4 Q.H.

The opportunity to read some of the most interesting works of Spanish literature without the intensive survey required in the Masterpieces course. Conducted in English.

32.214 Readings in Latin American Literature

(Prereq. 32.204 or equiv.) 4 Q.H.

Companion course to 32.213. Emphasis upon the literature of Latin America. Conducted in English.

32.215 Backgrounds in Hispanic Culture I

4 Q.H.

Open to all interested students. A reading knowledge of Spanish is helpful, but *not* essential. This course provides a multimedia survey of Spanish culture: slides, concerts, films, field trips, and guest lecturers utilized. Language majors should consult with the instructor concerning possible major credit. Conducted in English.

Prof. Kitchin

Fall and Winter Qtrs.

32.216 Backgrounds in Hispanic Culture II

(Prereq. 32.204 or equiv.) 4 Q.H.

Reading knowledge of Spanish required. This course begins with a survey of the three most important pre-Colombian cultures (Incas, Mayas, and Aztecs). Subsequently, the focus is on

intellectual history of Latin America. Readings include *Carta de Jamaica* and *Discurso ante el Congreso de Angostura*.

Miss Lopez

Spring and Summer Qtrs.

32.227 Spanish Composition and Conversation I (Prereq. 32.204 or equiv.) 4 Q.H.

Practice in writing and speaking Spanish, including written and oral resumes, prepared speeches and themes, impromptu speaking and writing. A review of the more subtle problems of grammar.

Prof. Jaramillo and Staff

Fall and Winter Qtrs.

32.228 Spanish Composition and Conversation II (Prereq. 32.227 or equiv.) 4 Q.H.

Further practice in oral and written Spanish; continued study of problems of advanced Spanish grammar.

Prof. Jaramillo and Staff

Spring and Summer Qtrs.

32.229 Advanced Spanish Proficiency I (Prereq. Consent of instructor) 4 Q.H.

Designed for those preparing to enter the teaching profession, as well as qualified advanced students. Advanced elements of Spanish syntax, with emphasis upon achieving superior speaking, reading, and writing skills.

Prof. Jaramillo

Fall and Winter Qtrs.

32.230 Advanced Spanish Proficiency II

(Prereq. 32.229 and consent of instructor) 4 Q.H.

Continuation of aims and goals of 32.229.

Prof. Jaramillo

Spring and Summer Qtrs.

32.231 Masterpieces of Spanish Literature I (Prereq. 32.204 or equiv.) 4 Q.H.

Introductory course in Spanish literature. Selected works from the Middle Ages to the *Siglo de Oro*.

Miss Lopez

Fall and Winter Qtrs.

32.232 Masterpieces of Spanish Literature II (Prereq. 32.204 or equiv.) 4 Q.H.

Introductory course in Spanish literature. Selected works from the 19th and 20th centuries.

Miss Lopez

Spring and Summer Qtrs.

32.239 Spanish Literature of the Middle Ages (Prereq. 32.232 or equiv.) 4 Q.H.

Selections from the major works of the Middle Ages, from the *Poema del Cid* to the *Libro de buen amor*.

Prof. Modee

Fall and Winter Qtrs.

32.241 Spanish Literature of the 15th and 16th Centuries

(Prereq. 32.232 or equiv.) 4 Q.H.

Selections from the major works of the 15th and 16th centuries, from *La Celestina* to mysticism.

Prof. Modee

Spring and Summer Qtrs.

32.243 Spanish Literature of the Golden Age (Prereq. 32.232 or equiv.) 4 Q.H.

Cervantes; selections from the *Entremeses*, the *Novelas ejemplares*, and *Don Quijote*, with emphasis on the latter as Spain's greatest literary masterpiece.

Prof. Kitchin

Offered 1975-76

32.244 Spanish Literature of the Golden Age (Prereq. 32.232 or equiv.) 4 Q.H.

Readings from the *comedias* of Lope de Vega, Tirso de Molina, Galderon, and Ruiz de Alarcon; also prose and poetry selections from Gongora and Quevedo.

Prof. Kitchin

Offered 1975-76

32.247 Spanish Literature of the 19th Century (Prereq. 32.232 or equiv.) 4 Q.H.

Readings in the prose, poetry, and drama of the romantic period, including selections from el Duque de Rivas, Larra, Espronceda, Zorrilla, and Becquer.

Prof. Modee

Offered 1975-76

32.248 Spanish Literature of the 19th Century (Prereq. 32.232 or equiv.) 4 Q.H.

A study of some of the major novelists of the second half of the 19th century.

Prof. Modee

Offered 1975-76

- 32.249 Spanish Literature of the 20th Century** (Prereq. 32.232 or equiv.) 4 Q.H.
 Selections from the writings of the Generation of '98: Unamuno, Valle-Inclan, Pio Baroja, Benavente, Azorin, and the Machado brothers.
 Prof. Jaramillo Fall and Winter Qtrs.
- 32.250 Spanish Literature of the 20th Century** (Prereq. 32.232 or equiv.) 4 Q.H.
 Prose and poetry of modern writers, such as Ortega y Gasset, Perez de Ayala, Garcia Lorca, Juan Ramon Jimenez, Gironella, and Jose Cela.
 Prof. Jaramillo Spring and Summer Qtrs.
- 32.251 Latin American Literature** (Prereq. 32.232 or equiv.) 4 Q.H.
 Early Latin American literature; the literature of the colonial period and the early 19th century based primarily on selections from an anthology.
 Prof. Jaramillo Offered 1975-76
- 32.252 Latin American Literature** (Prereq. 32.232 or equiv.) 4 Q.H.
 Modern Latin American literature; readings from 19th- and 20th-century prose and poetry.
 Prof. Jaramillo Offered 1975-76
- 32.291, 32.292, 32.293, 32.294 Directed Study** (each) 4 Q.H.
 Staff All Qtrs.
- 32.295, 32.296, 32.297, 32.298 Honors Program** (each) 4 Q.H.
 Staff All Qtrs.

German

Prerequisites listed for Modern Languages are based on current course numbers at Northeastern. Equivalent course work done elsewhere will be considered acceptable to satisfy these prerequisites.

- 33.201 Elementary German I** 4 Q.H.
 Essentials of grammar, practice in pronunciation, acquisition of a basic vocabulary, idiomatic expressions.
 Prof. Cooperstein and Staff Fall and Winter Qtrs.
- 33.202 Elementary German II** (Prereq. 33.201) 4 Q.H.
 More difficult points of grammar; reading of simple German prose, with oral and written exercises.
 Prof. Cooperstein and Staff
- 33.203 Intermediate German I** (Prereq. 33.202) 4 Q.H.
 Reading practice, using texts of average difficulty; review of grammar; written and oral exercises.
 Prof. Aluf and Staff
- 33.204 Intermediate German II** (Prereq. 33.203) 4 Q.H.
 Readings from modern German prose; practice in speaking and writing.
 Prof. Aluf and Staff
- 33.205 Reading German in the Arts and Sciences** 4 Q.H.
 A one-quarter course designed to give students sufficient knowledge of German grammar and sentence structure to enable them to translate critical and scientific texts with the aid of a dictionary. Students do not learn to speak or write German; instead, class time is devoted to the acquisition of the grammar necessary for translation, as well as to practice in translating texts from various scientific and humanistic fields. May not be used to fulfill a language requirement.
- 33.207 Scientific German** (Prereq. 33.204, 33.205, or equiv.) 4 Q.H.
 Review of grammar and syntax; advanced readings in expository German. Articles dealing with chemistry, physics, mathematics, biology, and other disciplines in the arts and sciences, in keeping with the students' major fields.
 Prof. Aluf Spring and Summer Qtrs.

33.217 German Literature in Translation I

4 Q.H.

Elective open to all students. Offers a study of some of the most significant works of German literature in translation. Topics vary from year to year. Language majors receive major credit for this course *only* by making special arrangements with the instructor for extra work to be done. Conducted in English.

33.218 German Literature in Translation II

4 Q.H.

Companion course to 33.217. Readings center around the theme of "The Search for Identity." Novels and plays by such 20th-century German authors as Mann, Rilke, Frisch, and Durrenmatt are read.

33.227 German Composition and Conversation I

(Prereq. 33.204) 4 Q.H.

Aimed at developing writing and speaking ability. Some grammar review and weekly compositions; prepared and impromptu speaking on a variety of topics dealing with everyday German life.

Ms. Boehme

Winter Qtr.

33.228 German Composition and Conversation II

(Prereq. 33.227) 4 Q.H.

A continuation of 33.227.

Ms. Boehme

Summer Qtr.

33.231 Masterpieces of German Literature I

(Prereq. 33.204 or equiv.) 4 Q.H.

Readings of 20th-century works accompanied by selections from major writers extending from the *Hildebrandslied* to Luther.

Ms. Boehme

Fall Qtr.

33.232 Masterpieces of German Literature II

(Prereq. 33.204 or equiv.) 4 Q.H.

Readings of 19th-century works accompanied by selections from major writers from Luther to the present.

Ms. Boehme

Spring Qtr.

33.245 Classical Period of German Literature

(Prereq. 33.232 or equiv.) 4 Q.H.

Background and general survey of the period from 1750 to 1800, with particular emphasis on the works of Lessing and Schiller. Lectures and collateral readings.

Prof. Cooperstein

Fall and Winter Qtrs.

33.246 The Works of Goethe

(Prereq. 33.232 or equiv.) 4 Q.H.

Dramas, prose writings, and lyric poetry of Goethe. Lectures, collateral readings, reports.

Prof. Cooperstein

Spring and Summer Qtrs.

33.247 German Literature of the 19th Century

(Prereq. 33.232 or equiv.) 4 Q.H.

Background and general survey of German literature in the 19th century, with particular attention to prose and lyric poetry.

Prof. Cooperstein

Offered 1975-76

33.248 German Drama of the 19th Century

(Prereq. 33.232 or equiv.) 4 Q.H.

Plays by Kleist, Hebbel, Grillparzer, and Ludwig. Lectures, collateral readings, reports.

Prof. Cooperstein

Offered 1975-76

33.249 German Literature of the 20th Century

(Prereq. 33.232 or equiv.) 4 Q.H.

Recent German literature, particularly prose and lyric poetry.

Prof. Cooperstein

Offered 1976-77

33.250 German Drama of the 20th Century

(Prereq. 33.232 or equiv.) 4 Q.H.

Plays by Schnitzler, Hofmannsthal, Wedekind, Kaiser, Toller, Unruh, and Weichert.

Prof. Cooperstein

Offered 1976-77

33.251 The German Lyric

(Prereq. 33.204 or equiv.) 4 Q.H.

German lyric poetry from the 12th century to the present. Analysis of selected poems, reports, discussions.

Prof. Aluf

Fall and Winter Qtrs.

33.252 The Dramatic Works of Franz Grillparzer

(Prereq. 33.204 or equiv.) 4 Q.H.

Reading, analysis and interpretation of selected plays of Franz Grillparzer, Austria's greatest

dramatist. Collateral readings, discussions, reports.

Prof. Aluf

Not offered 1974-75

33.291, 33.292, 33.293, 33.294 Directed Study

(each) 4 Q.H.

Staff

All Qtrs.

33.295, 33.296, 33.297, 33.298 Honors Program

(each) 4 Q.H.

Staff

All Qtrs.

Russian

Prerequisites listed for Modern Languages are based on current course numbers at Northeastern. Equivalent course work done elsewhere will be considered acceptable to satisfy these prerequisites.

34.201 Elementary Russian I

4 Q.H.

Essentials of grammar, practice in pronunciation, progressive acquisition of a basic vocabulary, idiomatic expressions.

Staff

Fall and Winter Qtrs.

34.202 Elementary Russian II

(Prereq. 34.201) 4 Q.H.

Continuation of grammar study; oral and written exercises.

Staff

Spring and Summer Qtrs.

34.203 Intermediate Russian I

(Prereq. 34.202) 4 Q.H.

Designed to further the student's knowledge of Russian through oral and written work; the study of grammar and reading in texts of moderate difficulty.

Staff

Fall and Winter Qtrs.

34.204 Intermediate Russian II

(Prereq. 34.203) 4 Q.H.

Continuation of work and aims of 34.203.

Staff

Spring and Summer Qtrs.

34.207 Scientific Russian

(Prereq. 34.204 or equiv.) 4 Q.H.

Readings of Russian texts in mathematics, physics, chemistry, astronomy, biology, and medical science. Designed to prepare the student for the departmental reading examination he may wish to take in his chosen field. As far as possible, texts are selected on the basis of the students' needs and interests.

Prof. Spiegel

Not offered 1974-75

34.215 Backgrounds of Russian Culture

4 Q.H.

Conducted in English. Designed to give the student a view of all aspects of Russian culture and civilization. The course utilizes guest speakers, films, field trips, and discussions in its presentation. Language majors should consult with the instructor concerning possible major credit.

Prof. Spiegel

Spring and Summer Qtrs.

34.217 The Works of Alexander Pushkin in English Translation

4 Q.H.

A survey and analysis in English of Alexander Pushkin's artistic prose, his lyric, his correspondence, and *Eugene Onegin* (his novel in verse). Some attention is devoted to the story of his life, literary friendships, and major literary influences. Language majors should consult with the instructor concerning possible major credit.

Prof. Spiegel

Fall and Winter Qtrs.

34.227 Russian Composition and Conversation I

(Prereq. 34.204) 4 Q.H.

Designed to develop skills in speaking and writing of colloquial Soviet usage of the Russian language. Classroom work is supplemented with tapes.

Mr. Ford

Fall and Winter Qtrs.

34.228 Russian Composition and Conversation II

(Prereq. 34.227) 4 Q.H.

A continuation of 34.227.

Mr. Ford

Spring and Summer Qtrs.

34.247 Russian Short Stories of the 19th Century

(Prereq. 34.204) 4 Q.H.

Detailed analysis of selected representative plays read in Russian; study of the development of this genre.

Staff

Not offered 1974-75

34.248 Russian Drama of the 19th Century

(Prereq. 34.204) 4 Q.H.

Detailed analysis of selected representative plays read in Russian; study of the development of this genre.

Staff

Not offered 1974-75

34.251 Russian Expository Prose

(Prereq. 34.204) 4 Q.H.

Selected readings of lectures, speeches, essays, and critical studies by outstanding Russian scholars.

Staff

Not offered 1974-75

34.253 Russian Folklore

(Prereq. 34.204) 4 Q.H.

Various genres of Russian folk literature read in Russian. Readings are supplemented with lectures and tape recordings.

Staff

Not offered 1974-75

34.254 Russian Poetry

(Prereq. 34.204) 4 Q.H.

The major works of important classical and modern poets read in Russian and analyzed.

Staff

Not offered 1974-75

34.255 Pushkin's Artistic Prose

(Prereq. Consent of instructor) 4 Q.H.

Reading of Pushkin's major prose fiction in the original, accompanied by stylistic and structural analyses. Background materials and articles of criticism are consulted. Individual oral presentations by students (in English) and research papers (in English) by arrangement with instructor.

Prof. Spiegel

Fall and Winter Qtrs.

34.256 Pushkin's Narrative Poetry

(Prereq. Consent of instructor) 4 Q.H.

Reading of Pushkin's narrative poems in the original, accompanied by the study of the author's poetic techniques and devices. The evolution of this genre is examined in the light of literary trends, influences, and controversies. Research papers on selected topics in English.

Prof. Spiegel

Spring and Summer Qtrs.

34.291, 34.292, 34.293, 34.294 Directed Study

(each) 4 Q.H.

Staff

All Qtrs.

34.295, 34.296, 34.297, 34.298 Honors Program

(each) 4 Q.H.

Staff

All Qtrs.

Italian

Prerequisites listed for Modern Languages are based on current course numbers at Northeastern. Equivalent course work done elsewhere will be considered acceptable to satisfy these prerequisites.

35.201 Elementary Italian I

4 Q.H.

Essentials of grammar, practice in speaking and reading, progressive acquisition of basic language skills.

Staff

Fall and Winter Qtrs.

35.202 Elementary Italian II

(Prereq. 35.201) 4 Q.H.

Continuation of grammar study and basic language skills. Reading of Italian of increasing difficulty; practice in conversation.

Staff

Spring and Summer Qtrs.

35.203 Intermediate Italian I

(Prereq. 35.202) 4 Q.H.

Continuation of grammar. Oral practice and the reading of selected texts.

Staff

Fall and Winter Qtrs.

35.204 Intermediate Italian II

(Prereq. 35.203) 4 Q.H.

Continuation of 35.203, with greater emphasis on reading.

Staff

Spring and Summer Qtrs.

35.217 The Works of Dante in Translation

4 Q.H.

This course will consider and analyze various aspects of the *Vita Nuova* and the *Divina Commedia*. Bilingual texts will be used so that students with a background in Italian, and others, may refer to the original for added interest and enrichment.

Prof. Fabrizi

Spring and Summer Qtrs.

35.227 Italian Composition and Conversation I

(Prereq. 35.204) 4 Q.H.

Aims at perfect speaking and writing ability. The basis of work is analysis of the language, oral and written reports, and general discussions. Conducted in Italian.

Prof. Fabrizi

Fall and Winter Qtrs.

35.228 Italian Composition and Conversation II

(Prereq. 35.227) 4 Q.H.

Continuation of 35.227, with stress on individual work, free discussions, and compositions. Conducted in Italian.

Prof. Fabrizi

Spring and Summer Qtrs.

35.231 Masterpieces of Italian Literature I

(Prereq. 35.204) 4 Q.H.

Introductory course in Italian literature. Selected works from the *Trecento* to the 18th century.

Prof. Fabrizi

Fall and Winter Qtrs.

35.232 Masterpieces of Italian Literature II

(Prereq. 35.204) 4 Q.H.

Introductory course in Italian literature. Selected works from the 19th and 20th centuries.

Prof. Fabrizi

Spring and Summer Qtrs.

35.291, 35.292, 35.293, 35.294 Directed Study

(each) 4 Q.H.

Staff

All Qtrs.

35.295, 35.296, 35.297, 35.298 Honors Program

(each) 4 Q.H.

Staff

All Qtrs.

Latin

36.201 Elementary Latin I

4 Q.H.

The essentials of Latin grammar, with progressive acquisition of skill in reading and translation of simple texts.

Ms. Landesman

Fall and Winter Qtrs.

36.202 Elementary Latin II

(Prereq. 36.201) 4 Q.H.

Continuation of 36.201. Additional grammar study and reading practice.

Ms. Landesman

Spring and Summer Qtrs.

36.203 Intermediate Latin I

(Prereq. 36.202 or equiv.) 4 Q.H.

Selective review of basic grammar; reading and translation principally from Classical Latin authors, with miscellaneous readings from later periods.

Ms. Landesman

Fall and Winter Qtrs.

36.204 Intermediate Latin II

(Prereq. 36.203 or equiv.) 4 Q.H.

Continuation of 36.203, with emphasis upon the further development in reading and translating skills.

Ms. Landesman

Spring and Summer Qtrs.

Journalism

38.101 History and Principles of Journalism

4 Q.H.

Development of American journalism from European and English beginnings. The problems

and contributions of the "Colonial Press," the Revolutionary War period, the "Party Press," the "Penny Press," and the leading contributions to early American journalism. The evolution of freedom of the press and the concurrent responsibility of the press media. Some writing required.

Prof. Speers

Fall and Winter Qtrs.

38.102 History and Principles of Journalism

4 Q.H.

A continuation of 38.101 from mid-19th century. America's great personal journalists and mass circulation "giants" and their contributions: Greeley, Bennett, Raymond, Dana, Grady, Nelson, Ochs, White, Medill, Pulitzer, Hearst, Scripps, Howard, McCormick, and others. The relationships of journalism to such events as the Civil War, the Spanish-American War; the unfolding principles. Some writing required.

Prof. Speers

Spring Qtr.

38.103 Fundamentals of Newswriting

4 Q.H.

Functions of the editorial department and procedures in obtaining and writing news stories. Extensive practice in writing news stories.

Profs. Ackerman and Kirtz

Fall and Winter Qtrs.

38.104 Fundamentals of Newswriting (Prereq. 38.103 or consent of instructor) 4 Q.H.

Problems of reporting and news writing with written assignments in various types of spot news reporting.

Profs. Ackerman and Kirtz

Spring and Summer Qtrs.

38.105 Techniques of Journalism (Prereq. 38.104 or consent of instructor) 4 Q.H.

Advanced practice in writing news stories along with editorials, feature stories, criticisms and other assignments.

Profs. Ackerman and Kirtz

Fall and Winter Qtrs.

38.106 Techniques of Journalism (Prereq. 38.105 or consent of instructor) 4 Q.H.

Editing the news, with practice in copy editing, headline writing, and newspaper makeup.

Profs. Ackerman and Kirtz

Spring and Summer Qtrs.

38.107 The Press and Society

4 Q.H.

The relationships of the press media to American society; the various roles of the press; the unfolding legislative pattern before and after the First Amendment; some outstanding court cases concerning the press: i.e., contempt of court, licensing, taxing the press; relationships between the press and the U.S. Post Office. A study project, involving work with professional newspapers, is required.

Dr. Levine

Fall and Winter Qtrs.

38.108 The Press and Society

4 Q.H.

Some of the major legal considerations concerning the press media, such as libel and slander; right of privacy; the public's "right to know"; some current and past restrictive legislation. A study project involving work with professional newspapers is required.

Dr. Levine

Spring Qtr.

38.121 Television Newswriting

4 Q.H.

Techniques of writing for television news as opposed to writing for other news media. The marriage of script to various video outputs; importance of the writer-reporter in both his new roles as a field-producer and a writer-producer; terms and language used in the production of T.V. news shows. Actual individual production of student news shows; field trips to T.V. stations; guest lecturers from the T.V. news media.

Mr. Ruttenberg

38.122 Television News Production

4 Q.H.

An in-depth study of the techniques and language used by the electronic journalist and the T.V. news producer. The student will learn how to build a T.V. news show from studying varied inputs of the broadcasting journalist utilizing sight, sound and motion derived from film, video tape, slides, photos, tape recorders and other tools used world-wide in television news production.

Winter and Spring Qtrs.

38.130 Advanced Reporting

4 Q.H.

All over the country increasing numbers of special teams are being utilized to handle investigative reporting. This course covers the daily press, but also delves into the techniques used by radio-T.V., the underground press, wire services, suburban weeklies, and magazines. Students participate in a selected controversial project and produce a series for publication and broadcast.

Mr. Strum

38.135 Public Affairs and Journalism

4 Q.H.

A series of seminars featuring well-known professionals from major newspapers, radio-T.V. stations, wire services, magazines, photography, and public relations. An up-to-date, in-depth explanation of techniques and theories utilized in various media. Instructors include many award winners and even Pulitzer Prize recipients. Sponsored by the New England Chapter of Sigma Delta Chi, the professional journalism organization, to benefit its journalism scholarship program at the University.

38.190 Directed Study in Journalism

(Prereq. Consent of instructor) 4 Q.H.
Fall, Winter, and Spring Qtrs.

Economics

Unless otherwise stated there are no prerequisites for advanced economics courses. Exceptions are made at the discretion of the instructor.

39.105 Principles of Economics

4 Q.H.

Development of macroeconomic analysis; review of national income concepts; national income determination, fluctuation, and growth; role of the banking system and the Federal Reserve System; government expenditures and taxation; international trade; balance of international payments.

Staff

Fall and Winter Qtrs.

39.106 Principles of Economics

4 Q.H.

The role of a market pricing system, demand and supply, in determining the allocation of resources to competing uses and why this system may not function adequately in certain areas. Application of economic principles to private and public problems in such areas as pollution, poverty, and racial discrimination.

Staff

Spring and Summer Qtrs.

39.115 Principles and Problems of Economics

4 Q.H.

An introduction to the conceptual aspects of economics; the flow of national income; economic growth and fluctuation; the role of money and banking; monetary and fiscal policies. Emphasis on developing conceptual tools for use in the analysis of economic problems facing modern society.

Staff

Fall and Winter Qtrs.

39.116 Principles and Problems of Economics

4 Q.H.

Development of basic theory of demand, supply, and market price. Applications to selected microeconomic problems, such as basic economics of monopoly and competition, poverty, race and discrimination, urban affairs, pollution, and other problems which relate to the role of the pricing system in resource allocation and income distribution.

Staff

Spring and Summer Qtrs.

39.125 Economics

4 Q.H.

Macroeconomic problems, theory and policy; basic economic concepts and the institutional setting of the American economic system, its goals and problems; national income and product definition and measurement; the theory of income determination; the relation between prices and money; the mechanics of commercial banking operations, central banking, and monetary policy; government and fiscal policy; appraisal of stabilization policies; economic growth theory and problems.

Prof. DeCicco

Fall and Winter Qtrs.

39.126 Economics

4 Q.H.

Explanation of elements of demand, supply and cost, market pricing, and allocation of resources. Application of market theory to selected current areas of concern: pollution, poverty, racial discrimination, urban problems, monopoly and competition, etc.

Prof. DeCicco

Spring and Summer Qtrs.

39.130 Medical Economics

4 Q.H.

Examination and discussion of the following topics: health care trends in the United States; causes for increases in medical care costs; supply and training of health care personnel; the nation's need for physicians, nurses, pharmacists and other allied health personnel; the quality of medical care; economics of health insurance plans; consumer demand for health care, medical facilities, professional personnel, and semi-professional personnel.

Prof. Goldstein

Spring Qtr.

39.140 Economics of Crime

4 Q.H.

Theoretical and empirical analysis of the economic causes of criminal behavior will be presented. The social costs of crime and its prevention will be covered, and techniques for designing optimum law enforcement policies will be developed.

Prof. Hellman

Fall and Winter Qtrs.

39.150 Economics of World Energy and Primary Resources

4 Q.H.

Investigates economic, political and historical backgrounds of the energy and other resources problems. Future impact of primary resources limitations on U.S. and world economics will be analyzed. Feasibility studies of resource substitution.

Staff

Winter Qtr.

39.155 Superpower Economics

4 Q.H.

Will analyze the relative economic structure and strength of the U.S., U.S.S.R., Japan, and the Common Market and China, as well as the economic relations among these powers. Will also examine the impact of these relations on the domestic economies of the superpowers and of the developing nations of the world.

Staff

Spring Qtr.

39.190, 39.191 Directed Study

(each) 4 Q.H.

Independent work under the direction of a member of the Department on a chosen topic. Limited to qualified seniors majoring in Economics, with approval of Department.

Staff

39.250 Statistics I

4 Q.H.

Elementary set theory, basic probability, Bayesian decision making, measurement and presentation of economic statistics, descriptive statistics, basic estimation techniques, applications.

Staff

Fall and Winter Qtrs.

39.251 Statistics II

(Prereq. 39.250) 4 Q.H.

Testing statistical hypotheses, sampling problems; analysis of variance; correlation and linear regression analysis; multivariate regression analysis.

Staff

Spring and Summer Qtrs.

39.255 Microeconomic Theory

(Prereq. 39.106, 39.116, or 39.126) 4 Q.H.

A detailed study of supply and demand analysis, various elasticity concepts and applications, theory of consumer demand, theory of production, derivation of cost curves. Detailed analysis of pricing and output behavior in the several market structures with their welfare implication; the pricing of resources.

Prof. Kim

Fall and Winter Qtrs.

39.256 Macroeconomic Theory

(Prereq. 39.105, 39.115, or 39.125) 4 Q.H.

Investigation of the conceptual and empirical problems of creating and using national accounts; price index problems; conceptual and empirical evaluation of several consumption and investment functions, and their policy implications; multiplier and accelerator models; a brief history of recent cyclical fluctuations. Theories of inflation and growth are analyzed in the light of recent economic history.

Prof. Shelby

Spring and Summer Qtrs.

39.259 European Economic Development

4 Q.H.

Economic inheritance of the 19th-century development of capitalism and laissez-faire. The aftermath of the Industrial Revolution, European overseas expansion, the 20th century, the world wars, the dissolution of empires, American economic conquest and European integration, the future of less developed areas in southern Europe. Environmental impact of industrialism and the implications of technological society.

Prof. Schachter

Fall Qtr.

39.260 American Economic Development

4 Q.H.

Economic development of the U.S. from the colonial period to the present; historical changes in available factors; economic institutions and technologies; special attention to preconditions of industrialism. The American Industrial Revolution, its spread and socioeconomic consequences. The Great Depression and the subsequent rise of mixed economy and welfare state; U.S. adjustments to postwar economic changes.

Prof. Shelby

Spring Qtr.

39.261 Economic History of Less-Developed Countries

4 Q.H.

The problems of initiating and sustaining growth in selected third-world countries during the last 200 years, with emphasis on traditional vs. contemporary economic development. Role of Western society; impact of technological and structural changes; relations between states and economic enterprises.

Staff

Winter Qtr.

39.265 Money and Banking

(Prereq. 39.105, 39.115, or 39.125) 4 Q.H.

The nature and function of money, credit, and monetary standards, and the role of our monetary and banking system in the economy. Topics include: commercial banking, monetary theory and policy, the role and instruments of the Federal Reserve System, and international monetary problems.

Prof. Caligaris

Spring and Summer Qtrs.

39.266 Government Finance

(Prereq. 39.106, 39.116, or 39.126) 4 Q.H.

Fiscal functions, institutions, and politics; growth of the public sector; expenditure planning in theory and practice; cost-benefit analysis; principles of taxation and tax incidence; major taxes at Federal and state-local levels; fiscal policy for high employment, price stability, and growth; current fiscal problems such as tax reform, urban fiscal problems, fiscal federalism, and income maintenance programs.

Prof. Musgrave

Fall and Winter Qtrs.

39.267 Economics of Urban Transportation

4 Q.H.

Transportation and land-use patterns; externalities; social costs and social benefits of various modes of urban transportation; ownership, regulations, and financing of various modes of transportation; economies of new technology in urban transportation.

Prof. Swanson

Winter Qtr.

39.268 Urban Economics

4 Q.H.

An inquiry into the causes of the location and the growth of urban centers; economic analysis of selected urban problems.

Prof. Hellman

Fall and Winter Qtrs.

39.269 Urban Economic Problems and Policies

4 Q.H.

Sequel to Urban Economics. Detailed analysis of urban problems, such as housing, transportation, land use, and public services. Exploration of public policies related to such problems.

Prof. Hellman

Spring and Summer Qtrs.

39.271 Social Control of Economic Activities

4 Q.H.

Development of the government's role in economic activities, examining the relationship between the government and industry, labor, agriculture, public utilities, and consumers. The course will trace the changing role of the government from a laissez-faire policy to one of direct intervention in the economy. Current topics such as wage and price control,

environment and anti-pollution policies, consumer protection, and conglomerate mergers will be discussed.

Prof. Horowitz

Fall Qtr.

39.273 Industrial Organization and Public Policy

(Prereq. 39.255) 4 Q.H.

The theoretical framework for analysis and evaluation of the static and dynamic performance of real markets. An examination of the empirical studies testing the usefulness of applying theory to real markets. An examination of antitrust as a public policy designed to promote better market performances.

Staff

Spring Qtr.

39.275 Labor Economics

4 Q.H.

Examination of the economics of the labor market and the labor force and of the institutions and policies dealing with them; employment, unemployment, wage determination, income distribution, and the development and efficient use of labor resources; development of trade unions; collective bargaining issues and their economic consequences.

Prof. Herrnsstadt

Winter and Spring Qtrs.

39.277 Economics of the Quality of Urban Environment and Control

4 Q.H.

Economic analysis of air, water, thermal, and noise pollution; the utilization of urban space and other urban resources; identification of possible economic effects of urban environment, such as crime, delinquency, immobility, and congestion.

Prof. Swanson

Fall and Winter Qtrs.

39.278 Poverty and Discrimination

4 Q.H.

Analysis of trend and composition of poverty in America. Examination of labor market, demographic and institutional forces contributing to poverty; role of education; economics of race and sex discrimination; public welfare system and proposed reforms.

Prof. Sum

Fall and Winter Qtrs.

39.279 Manpower and Anti-Poverty Policies and Programs

4 Q.H.

Sequel to 39.278, Poverty and Discrimination; assessment of government and private efforts to fight poverty and improve the labor market position of impoverished groups; relationship between causes of poverty and discrimination; and possible remedies. Manpower training programs, negative income tax, family allowances, and other income maintenance schemes.

Prof. Sawhney

Spring and Summer Qtrs.

39.280 Comparative Economics

4 Q.H.

Competing types of theoretical economic systems; analysis of organization and operation of currently existing types of communist, socialist, and capitalist economies; comparison and evaluation of economic behavior and performance of different economic systems.

Prof. Shelby

Spring and Summer Qtrs.

39.281 Introduction to Mathematical Economics

(Prereq. 39.105, 39.115, or 39.125; and 39.106, 39.116, or 39.126; and 10.105; calculus not required) 4 Q.H.

Functional analysis, matrix algebra, analysis of statistical economics models, derivatives, and differentiation and optimization.

Prof. Coelen

Fall and Winter Qtrs.

39.282 Mathematical Economics

(Prereq. 39.281 or consent of instructor) 4 Q.H.

For economics, mathematics, business, and engineering students interested in a broad coverage of economic analysis using mathematical techniques as tools. Topics are: models of the firm, demand theory, input-output, and other planning and policy models of the national economy.

Staff

Spring Qtr.

39.285 Economic Development

4 Q.H.

Prospects for economic growth in poor nations as indicated by economic analysis and historical experience; social, cultural, and institutional determinants of growth; implications for the international position and policies of the U.S.

Prof. Schachter

Fall and Winter Qtrs.

39.286 International Economics

(Prereq. 39.106, 39.116, or 39.126) 4 Q.H.

Introduction to the theory of international trade and its role in resource allocation; implications of economic welfare; foreign exchange; the balance of payments mechanism; and problems of disequilibrium and adjustment.

Staff

Spring Qtr.

39.288 Economic Growth and Instability

(Prereq. 39.105, 39.115, or 39.125) 4 Q.H.

Measurement and cost of economic growth and instability; long-run models and explanations of aggregate growth; short-run models and causes of fluctuations in output, employment, and prices; long-run forecasts of aggregate change; policies for optimal growth and stability.

Prof. Shelby

Fall and Winter Qtrs.

39.289 Advanced Economic Theory

(Prereq. 39.255 and 39.256) 4 Q.H.

Advanced theoretical treatment of selected topics in microeconomics and macroeconomics. Recommended for students planning to take graduate economics.

Staff

Spring Qtr.

39.291 Senior Economic Seminar

(Prereq. 39.255 and 39.256) 4 Q.H.

Course for senior Economics majors; coordinating and applying economic concepts, methodology, and data to contemporary issues and problems of broad social, economic, and philosophical importance.

Prof. DeCicco

Spring Qtr.

39.292 History of Economic Thought

4 Q.H.

Comprehensive course of study in the development of economic thought. Coverage includes mercantilism as the first economic doctrine; analysis of older classical school, its later refinements (modern marginalism), and its important critics (socialists, Marxists); Keynesian and modern developments.

Prof. DeCicco

Spring Qtr.

39.293 Introduction to Econometrics

(Prereq. 39.105, 39.115, or 39.125; and 39.106, 39.116, or 39.126; and 39.251) 4 Q.H.

The methods of econometric estimation and forecasting. Coverage includes topics in various statistical techniques. Students are given the opportunity to construct their own models and use computer facilities for estimation and forecasting.

Prof. Coelen

Spring Qtr.

39.294 Problems in Economic Research

(Prereq. 39.105, 39.115, or 39.125; and 39.106, 39.116, or 39.126; and 39.251) 4 Q.H.

Research methods of practicing economists with typical problems from applied areas of economics and choice of modeling framework; problems of data collection, review of estimation techniques and interpretation of results; development of static and dynamic adaptive policy models.

Staff

Spring Qtr.

39.295, 39.296, 39.297, 39.298 Honors Program

(each) 4 Q.H.

Prof. DeCicco

All Qtrs.

Accounting

41.111 Accounting Principles I

4 Q.H.

An exploration of the relationship between business activity and accounting, with focus on the nature and purpose of accounting; the uses of management accounting data and reports.

Staff

Fall and Winter Qtrs.

41.112 Accounting Principles II

(Prereq. 41.111) 4 Q.H.

Emphasizes financial reporting, measuring and appraising the financial results of business operations, and accounting for business assets.

Staff

Spring Qtr.

41.118 Principles of Accounting

8 Q.H.

Covers the content of courses 41.111 and 41.112. Intended for transfer students.

Staff

Fall and Summer Qtrs.

41.205 Cost Accounting for Management

(Prereq. 41.112) 4 Q.H.

An examination of cost accounting from a managerial viewpoint. The impact of quantitative and behavioral aspects on budgets and cost control is stressed.

Prof. Grossman and Staff

All Qtrs.

41.207 Analysis of Financial Statements

(Prereq. 41.112) 4 Q.H.

Preparation of accounting statements; uses of ratios and analytical statements; composition of statements and statement classification; fund and cash flow analysis.

Prof. Malchman

Not offered 1974-75

41.210 Introduction to Accounting - L.A.

4 Q.H.

For Liberal Arts undergraduates. A survey of the foundations of accounting and the role accounting plays in the management of the profit and non-profit sectors of the American economy.

Staff

Spring and Summer Qtrs.

41.213 Survey of Federal Taxes

(Prereq. 41.112) 4 Q.H.

Intended for the student who *has not majored in Accounting* but who desires to gain a basic appreciation and understanding of the Federal tax structure rather than detailed knowledge. A survey of Federal taxation as it applies to individuals, partnerships, corporations, gifts, estates, trusts, and business decisions.

Prof. Malchman

Not offered 1974-75

41.251 Intermediate Accounting

(Prereq. 41.112) 4 Q.H.

Emphasis on accounting theory and concepts, together with an analysis of the special problems that arise in applying these concepts to financial accounting. Areas discussed are: the basic accounting process, cash receivables, liabilities, and inventory valuation.

Prof. Slavin

Fall and Winter Qtrs.

41.252 Intermediate Accounting

(Prereq. 41.251) 4 Q.H.

Continuation of the discussion of the structure of accounting theory and its underlying issues, together with an evaluation of the conflicts and shortcomings in accounting concepts. Areas discussed are: investment in productive resources and accounting for corporations.

Prof. Slavin

Spring and Summer Qtrs.

41.253 Cost Accounting I

(Prereq. 41.112) 4 Q.H.

The accumulation of cost data for managerial analysis and control; familiarization with product costing systems and their usefulness.

Prof. Curran

Fall and Winter Qtrs.

41.254 Cost Accounting II

(Prereq. 41.253) 4 Q.H.

Budgetary planning and control, with emphasis on using cost data for decision-making.

Prof. Curran

Spring and Summer Qtrs.

41.257 Auditing

(Prereq. 41.252) 4 Q.H.

Designed to give the Accounting major a thorough knowledge of auditing through the application of auditing principles and adherence to auditing standards; the ethics of the profession; and the significance of new and advanced audit techniques.

Staff

Fall and Winter Qtrs.

41.260 Federal Taxes

(Prereq. 41.112) 4 Q.H.

Intended primarily to provide a comprehensive study of the Federal tax structure for the Accounting major who plans to enter the professional field of accounting. The student researches cases which introduce the various source materials on basic tax problems apart from specific changes made in the Internal Revenue Code. The course contains a thorough study of Federal taxation approaches to individuals, partnerships, and corporations.

Prof. Malchman

Fall and Winter Qtrs.

41.262 Accounting Theory and Practice

(Prereq. 41.252) 4 Q.H.

Objectives are to examine: 1. the theory and practice of corporate financial reporting and

some of the controversial areas in accounting; 2. the pronouncements and research studies of the authoritative institutions of the profession relating to the practice of accounting; 3. the textual and periodical literature on accounting theory.

Prof. Fetters

Fall and Winter Qtrs.

41.263 Accounting Planning and Control

(Prereq. 41.112) 4 Q.H.

The organization as a system, considering the informational needs for long- and short-run planning. The control mechanism in goal attainment. Includes both quantitative and behavioral aspects of planning and control.

Prof. Lindhe, Carter, and Staff

Spring and Summer Qtrs.

41.264 Advanced Accounting Problems I

(Prereq. 41.252) 4 Q.H.

Intended for the student who is planning to enter the professional field of accounting. Included are pronouncements and recent statements by authoritative bodies, as well as discussions of the various approaches to problem solving and a review of the accounting principles involved. Among the topics are: partnerships, installment sales, consignments, home office and branch office relationships, and governmental and institutional accounting.

Prof. Malchman

Fall and Winter Qtrs.

41.265 Management Accounting

(Prereq. 41.205, 41.253, or consent of instructor) 4 Q.H.

Designed as an "enlarged" managerial accounting course in which accounting technique is made subordinate to a consideration of management uses of the end products of accounting analysis. Its main objective is a greater appreciation of the role of accounting in the basic management functions of planning, controlling, and decision making.

Fall and Winter Qtrs.

41.266 Contemporary Accounting Problems

(Prereq. 41.252) 4 Q.H.

A seminar designed to survey some of the important problem areas currently facing the accounting profession. These areas will incorporate asset valuation, price-level adjusted statements, environmental considerations, income measurement, and governmental intervention.

Prof. Fetters

Spring and Summer Qtrs.

41.267 Tax Factors in Business Decisions

4 Q.H.

A survey of the role of taxes in decisions involving mergers, acquisitions, profit sharing, pension plans, contracts, costing procedures, employee compensation, and other tax-planning variables.

Prof. Curren

Not offered 1974-75

41.268 Appraisal of Management Enterprise

(Prereq. 41.112, 41.253) 4 Q.H.

Designed to examine the usefulness of accounting data in management appraisal, the course also discusses various approaches for accountants to provide a management appraisal which goes beyond the conventional financial statement. Topics are: management's social responsibilities, the attest function and possible extensions, behavioral aspects of using accounting data for performance evaluation, the accountant's role as a consultant, "management auditing," and "social audits."

Spring and Summer Qtrs.

41.269 Advanced Accounting Problems II

(Prereq. 41.252) 4 Q.H.

Intended for the student who plans to enter the professional field of accounting. The course consists of a concentrated study of three areas: 1. consolidations, 2. fiduciaries, and 3. actuarial science. Pronouncements and recent statements by authoritative bodies are discussed. Problem solving is used to demonstrate the application of accounting principles.

Prof. Malchman

Spring and Summer Qtrs.

Also see course 49.262 for Independent Study.

Marketing

43.120 Introduction to Marketing

4 Q.H.

An overview of marketing and its role both within the firm and within society. Emphasis on the

pervasive interrelationships among dynamic dimensions of the environment, marketing activities, consumer attitudes, and consumer behavior. Open as elective to non-CBA sophomore and upper-class students.

Staff

All Qtrs.

43.125 Consumer Problems of the 70s

4 Q.H.

Readings, discussions and class projects are used to examine and evaluate the responsibilities of business to society and to the consumer. Elective open to all upperclassmen.

Prof. Collazzo

Not offered 1974-75

43.223 Introduction to Advertising

4 Q.H.

An overview of advertising and its role in our society. Advertising is examined: 1. as part of marketing; 2. as a communications process; 3. as a viable social and economic force. Open to all upperclassmen.

Prof. Dufton

All Qtrs.

43.233 Retail Management

(Prereq. 43.120 or consent of instructor) 4 Q.H.

From a marketing management point of view, study is made of the activities and contributions of major retailing institutions, including department and specialty stores, supermarkets, and discount outlets. Upper-class elective.

Prof. Minichiello

Spring and Summer Qtrs.

43.235 Marketing Channels

(Prereq. 43.250 or consent of instructor) 4 Q.H.

Marketing structures and institutions; their evolution, functions, interrelationships, and the management of their role in the marketing process. Upper-class elective.

Prof. Verma

Spring Qtr., every other year

43.236 Retail Merchandising and Control

(Prereq. 43.120 or consent of instructor) 4 Q.H.

Concepts and techniques of store operations and merchandise management.

Prof. Minichiello

Fall and Winter Qtrs.

43.237 Retail Strategies and Problems (Prereq. 43.120 or consent of instructor) 4 Q.H.

The major strategic and policy decisions of important retailing institutions.

Prof. Minichiello

Spring and Summer Qtrs.

43.240 Marketing Research

(Prereq. 43.251 or consent of instructor) 4 Q.H.

The use of marketing research as a tool in planning and controlling marketing activities, including an introduction to the application of behavioral and quantitative concepts in the solution of marketing programs. Upper-class elective. Required for Marketing juniors.

Profs. Wiseman and Moriarty

Fall and Spring Qtrs.

43.242 Sales Management

(Prereq. 43.250) 4 Q.H.

Creation, management, and appraisal of the sales force. Case studies and discussions, plus selected readings. Junior and senior elective.

Prof. Minichiello

Fall and Winter Qtrs.

43.244 Quantitative Methods for Marketing Management

(Prereq. 49.251) 4 Q.H.

The contribution of quantitative techniques and the computer to decision-making in marketing and related business policy areas. Junior and senior elective.

Profs. Verma and Wiseman

Spring Qtr., every other year

43.250 Marketing Management I

(Required of Marketing majors) 4 Q.H.

An introduction to market analysis and the design and implementation of marketing strategies. Of primary concern is the appraisal of the environment of business and marketing activities, with particular emphasis on factors affecting the nature and extent of consumer demand. An upper-class elective prerequisite to a number of other elective Marketing courses. Open to non-Marketing majors in middler, junior, and senior years.

Profs. Minichiello and Verma

Fall and Winter Qtrs.

43.251 Marketing Management II

(Prereq. 43.250) 4 Q.H.

A continuation of 43.250. Based on understanding of business and marketing environment and of consumer demand, this quarter focuses on the interrelated roles of product, price,

distribution and promotion in the development and operation of marketing programs. Upper-class elective required of Marketing middlers.

Profs. Dufton and Verma

Spring and Summer Qtrs.

43.261 International Marketing

4 Q.H.

The opportunities, methods, and policies in management of international marketing programs. Upper-class elective.

Prof. Verma

Fall, Winter, and Spring Qtrs.

43.262 Advertising Management

(Prereq. 43.251 or consent of instructor) 4 Q.H.

Advertising management through class discussions of case studies selected to illustrate means of achieving proper balance and coordination of advertising with other elements in the marketing mix. Junior and senior elective.

Prof. Dufton

Spring Qtr.

43.265 Industrial Marketing

(Prereq. 43.250 or consent of instructor) 4 Q.H.

The marketing of products where business firms are the potential customers. Upper-class elective, open to juniors and seniors.

Prof. Dufton

Spring Qtr., every other year

43.271 New Product Development

(Prereq. 43.120) 4 Q.H.

An analysis of the problems which firms face in directing and managing their new product development activities. Open to seniors only.

Profs. McDonald and Verma

Spring Qtr.

43.275 Foundations of Consumer Behavior

(Prereq. 43.120) 4 Q.H.

Economic, behavioral, and other models of consumer behavior are examined as bases for the planning and evaluation of marketing effort. Upper-class elective.

Profs. Dufton and McDonald

Fall and Winter Qtrs.

43.278 Competitive Strategy

(Prereq. 43.251) 4 Q.H.

The capstone marketing course, a required elective for seniors majoring in Marketing. The focus is upon the formulation of marketing strategy at a policy level and its implementation in a dynamic environment.

Prof. McDonald

Fall and Winter Qtrs.

Also see course 49.262 for Independent Study.

Finance and Insurance

44.120 Introduction to Financial Activity

4 Q.H.

Acquaints students with the important analytical tools, habits of thought, concepts and knowledge surrounding the management of the flow of funds within the corporation. Deals with the firm's demand for capital, sources of capital, management of assets, dividend payments, and forecasting of funds needed.

Profs. Cerullo, Willett, and Staff

All Qtrs.

44.144 Management of Financial Institutions

(Prereq. 44.120) 4 Q.H.

Considers the broad range of decision-making problems faced by major financial institutions, such as commercial banks, savings and investment institutions, and finance companies when viewed as competitive, profit-seeking business entities. The course considers such topical areas as the nature and scope of the capital markets confronting these institutions, specialized problems with regard to the sources and uses of funds of the financial institutions, and strategic policy planning of financial institutions.

Prof. Fletcher

44.150 Corporate Financial Management

(Prereq. 44.120) 4 Q.H.

Extends a student's grasp of theory and analytical tools and concepts which have general applicability in most profit- and nonprofit-seeking organizations through readings and case discussions. Such analysis is primarily concerned with the evaluation of expected benefits

from invested capital in relation to its costs and availability. While techniques of economic appraisal are stressed, the course also aims to locate financial valuation within the overall structure of administrative decisions about financial resource allocation.

Prof. McCarthy and Staff

Fall and Winter Qtrs.

44.151 Interpreting Financial Data

(Prereq. 44.120) 4 Q.H.

Development of the capacity for proper utilization of financial accounting information in financial management. The specific objectives are fourfold: 1. an understanding of the differences between cash flows and reported profit (i.e., net income); 2. an awareness of the implications of "generally accepted accounting principles" for financial management; 3. recognition of the need for balancing attention to profitability matters with concern for balance sheet considerations (e.g., liquidity and solvency); and 4. an understanding of the auditor in achieving creditability with respect to financial data. Contemporary issues in financial reporting are examined, with view to illuminating the basic ideas of the course.

Prof. Caplan and Staff

Fall and Winter Qtrs.

44.159 Small Business Finance

(Prereq. 44.120) 4 Q.H.

Investigates the financial requirements of smaller businesses and the sources of funds open to them. Methods of financial control in the small business are covered, as well as requirements of financing institutions. The problem of obtaining adequate equity financing and equity sources is highlighted.

Prof. Hehre

Spring and Summer Qtrs.

44.160 International Financial Management

(Prereq. 44.150) 4 Q.H.

The issues and problems encountered by the financial function of an international firm. Considers the investment and financing decisions of a firm in the context of an international or multi-country environment. Specific topics are: capital budgeting, capitalization policies, the use of Eurocurrency and Euro-bond markets, and liquidity management by the international firm.

Staff

44.161 Financial Control Systems

4 Q.H.

The control process in the management of any organization and the role of systematic financial controls in facilitating that process. Particular attention given to the needs of financial managers as key participants in the process. The relationships between financial planning activities and financial control are examined. Other areas of emphasis in the course are: profit planning, budgeting, performance evaluation, and incentives tied to measured performance.

Prof. Caplan

44.162 Risk Management

(Prereq. 44.120) 4 Q.H.

The concept of risk and the ways of dealing with it, including risk reduction, risk combination, and insurance. Considerations of cost and risk management in comparison to the risk-cost preferences of the insurer.

Prof. Hehre

44.180 Investment Strategy

(Prereq. 44.120) 4 Q.H.

The objective is to present selection and valuation techniques for the purpose of constructing an investment portfolio of financial assets including common stocks and bonds. Topics covered are the evaluation of individual security risk and return characteristics and the interpretation of financial market behavior in the context of security valuation. Emphasis is on ways of evaluating individual security characteristics for portfolio purposes.

Staff

Fall and Winter Qtrs.

44.185 Management of Financial Resources

(Prereq. 44.120) 4 Q.H.

Focuses on the raising of the supply of funds and their allocation to long-term uses in order to accomplish an organization's objectives. Standard and innovative types of securities are surveyed and techniques for choosing the best mix of securities are developed. The processes by which funds are obtained are described. The determination of investment opportunities and systems for their evaluation are presented.

Spring and Summer Qtrs.

44.220 Insurance and Enterprise

(Prereq. 44.120) 4 Q.H.

A broad course approach to the theory and economics of the use of life, property, and casualty insurance in enterprises. Emphasis is on the principles underlying the selection and use of insurance as a tool to reduce risk exposure, with a thorough review of contract provisions, rate making, and loss adjustment.

Prof. Willett

Not offered 1974-75

44.240 Personal Finance

(Open to Business Administration students only with consent of instructor) 4 Q.H.

The management of the total personal estate; budgeting, savings, insurance, investments, borrowing, taxes, social security, pensions, annuities, securities markets, mutual funds, and their integration.

Prof. Cerullo

All Qtrs.

44.241 Personal Financial Management

4 Q.H.

Major theme of the course is the development of an integrated plan for personal choices in which alternative courses of action are judged by their contribution to the attainment of the decision-maker's particular set of economic objectives. The *overall personal economic plan* is the consistent focus of the course and unites such diverse topics as inflation, insurance, purchasing assets, etc. in a mutually reinforcing way. The course is decision oriented and attempts to not only expose students to alternative ways of doing things, but also to lead them toward a personal rational solution. This is done by developing techniques of estimating the success probabilities of alternative methods.

Prof. Willett

Spring and Summer Qtrs.

44.255 Estate Planning

(Prereq. 44.120) 4 Q.H.

Estate planning is essential for anyone who intends to advise others in the area of financial planning or desires to accumulate funds for himself or his dependents. It is concerned both with the accumulation of capital and its preservation. The objective of financial planning is to provide essential information necessary to make intelligent decisions and a knowledge of available alternatives. Expertise in this field requires an understanding of methods of integrating life insurance into an overall financial plan; a knowledge of basic information concerning wills, trusts, gifts, etc.; methods of funding business continuation; and estate liquidity requirements.

Prof. Willett

Not offered 1974-75

44.260 Financial Planning

(Prereq. 44.120) 4 Q.H.

A review and evaluation of the theory and practice of forecasting business and financial operations in both the short and long run. Particular attention is paid to controlling operations within goals and plans established by management and within constraints imposed by the industry and the national economy. The relationship of the business enterprise to the national economy is stressed.

Prof. Hehre

Spring and Summer Qtrs.

44.275 Money and Economic Activity

(Prereq. 44.120) 4 Q.H.

It is said: "Money is that institution which brought humanity from a primitive stage into civilization" and there is much truth in this statement. An American industrial society oriented toward general welfare and stability is also inconceivable without the help of a sound and well-organized monetary and banking system. In this spirit, the study of money and economic activity enriches the background of any student in business and finance with valuable knowledge for becoming an enlightened manager and citizen.

Profs. Fletcher and Rugina

Spring and Summer Qtrs.

44.290 Business Ethics

4 Q.H.

The survival of the American economic system depends, to a considerable degree, on the faith which the public places in the integrity of its business leaders. Their decisions are emulated and affect the national, ethical, and economic health. Individual student participation in this course assists students in recognizing the added complexity brought to business

problems by a consideration of ethics and/or responsibility and helps students to construct and solidify a personal code of ethics which they may follow in their own careers.

Prof. Willett

Not offered 1974-75

44.295 The Development of the Capitalistic System

4 Q.H.

Introduction to the arguments surrounding the nature and functioning of the American capitalistic system and capitalism in general. One school of thought accuses the system of being monopolistic, whereas another defends the system as being competitive. Around this argument, excerpts from the work of great economists are used to show the development of tools of analysis for a better understanding of western capitalistic society and its problems.

Prof. Rugina

Not offered 1974-75

Also see course 49.262 for Independent Study.

Management

45.112 Business Policy

(Prereq. 45.210) 4 Q.H.

Corporate strategy and its elements, including an analysis of the company, its resources and opportunities, its environment, and decision makers. Emphasis on decision making and implementation of strategy while operating a company in the context of a business simulation.

Staff

Fall and Winter Qtrs.

45.114 Social Change

(Prereq. 45.210 or consent of instructor) 4 Q.H.

Seminar survey of various contemporary views about the determinants, directions, and projected effects of a rapidly changing society on the behavior of individuals and groups, and such institutions as the industrial organization. This is fundamentally a reading/discussion seminar, and the class size is limited to students having a serious interest in examining a range of conceptual views on the nature of revolutionary social change in this decade, explaining its manifest signs, and projecting its implications.

Prof. Rochwarg

Fall and Winter Qtrs.

45.115 Small Group Behavior

(Prereq. 45.210 or consent of instructor) 4 Q.H.

Extends the student's understanding and awareness of the dynamics of group behavior by intensive experiential involvement, particularly through the use of situational scenarios in which classroom setting becomes the research learning laboratory. Selective use is made of related research on groups.

Prof. Rochwarg

Spring Qtr.

45.130 Opportunity Analysis and Venture Capital

(Prereq. 45.212 or consent of instructor) 4 Q.H.

Concerned with the essential tasks that are performed prior to the birth of a new venture. These include: finding a suitable business opportunity or developing an idea for a product or service; analyzing the feasibility of the opportunity; development of a business plan; structuring of the venture team; seeking sources of seed capital; and formation of a venture action plan leading to start-up of operations.

Prof. Olive

Fall Qtr.

45.160 Operations Planning and Control

(Prereq. 45.265) 4 Q.H.

The planning and control necessary for an enterprise to respond to customer demand. Specific topics include the design of the planning and control system, inventory planning and control, forecasting for operations planning, and operations scheduling.

Prof. Olive

Fall, Spring, and Summer Qtrs.

45.161 Operations Management Game

4 Q.H.

Designed to provide an experience in decision making under uncertainty by involving the student in developing and implementing a strategy in an on-going business. As a team, several students manage a firm in competition with several other student-managed firms in the same industry. By interacting with the computer, the student experiences and learns

about decision making in the initiation of his business, competitive bidding, capacity, scheduling, inventory management, labor force management, and other areas of operations management.

Prof. Shore

Fall and Spring Qtrs.

45.163 Purchasing and Materials Management

4 Q.H.

Concerned with decisions related to the flow of materials from supplier to point of use. Special emphasis on problems related to purchasing including negotiation, value analysis, supplier selection, etc. While greater emphasis is placed on materials management in manufacturing organizations, non-profit and non-manufacturing concerns are also included. Instructor applies latest research in field gleaned from projects sponsored by the National Association of Purchasing Management and the American Production and Inventory Control Society.

Prof. Ammer

Winter Qtr.

45.209 Organization Behavior I

4 Q.H.

Application of concepts from the behavioral sciences to an understanding of the behavior of people in organizational settings. Focus is on systematic approaches to understanding behavior, looking at people as individuals and as members of small groups, and determining implications for management. Emphasis on the development of student skills in applying behavioral concepts to situational problems.

Staff

Fall and Winter Qtrs.

45.210 Organization Behavior II

(Prereq. 45.209) 4 Q.H.

Continuation of study of behavior of people in organizations. Initial focus is on behavior of people in two-person relations and as members of separate groups. Later focus is on the understanding of large, complex organizations and simultaneous development of student's skill in planning and achieving change.

Human Resources Faculty

Spring and Summer Qtrs.

45.212 New Venture Creation - A Career Choice

4 Q.H.

Designed to assist students interested in small business to answer a number of important questions through a systematic analysis of their own potential for an entrepreneurial career, i.e., What is involved in starting my own business? What is my own entrepreneurial orientation and commitment? What managerial and behavioral skills do I need for achievement? How can I plan for my personal and entrepreneurial goals? Case discussions, self-assessment and goal-setting exercises guest speakers and a student-selected project are used.

Profs. Olive and Timmons

Fall and Winter Qtrs.

45.213 Risk-Taking Analysis

4 Q.H.

An investigation into the psychological and quantitative factors that define "risk" within a number of situations and how the perception of risk may influence the behavior of different personalities in different ways. The extensive research which has focused on casino gambling will be applied to other situations such as decision making, politics, suicide, automobile driving, and buyer behavior. Material from experimental psychology, statistics, psychoanalysis, and literature will be integrated within this investigation.

Prof. Shelley

Spring and Summer Qtrs.

45.250 Business and Society

(Prereq. 45.210) 4 Q.H.

An analysis of developing external influences on the business organization—social, legal, economics, cultural, ethical, and technical. Examination of the corporation in its interactions with these forces. Focus on reconciling the strains generated by these societal factors and their impact on the management and decision-making process.

Staff

Spring and Summer Qtrs.

45.251 Comparative Management

4 Q.H.

The ways in which organizational structure and management processes are shaped by the mission and objectives of the organization. Examination of different types of organizations: profit-oriented business organizations, public corporations, governmental agencies, unions,

schools and universities, research laboratories, police and military organizations, hospitals, trade associations, and voluntary groups.

Prof. Marshall

Winter Qtr.

45.258 Dynamics and Practice of Superior-Subordinate Relations

(Prereq. 45.210 or consent of instructor) 4 Q.H.

Behavioral theory and concepts applied to the understanding and performance of the leadership function in organizational management. Various laboratory procedures used in conjunction with discussion sessions to highlight individual and group concepts in problem sensing, location, and exercises as key guides to understanding.

Staff

Spring and Summer Qtrs.

45.260 Personnel - Industrial Relations

(Prereq. 45.210) 4 Q.H.

Investigating man and his institutions in the world of work. The "actors" (i.e., business organizations, managers, workers and unions) are examined in order to ascertain the assumptions, objectives, values, and behavior of each party under constraints. Among combinations of constraints considered are: technology, market or budgetry, legal, public values, and political systems. Utilizing the interactions which occur between the actors in the system, the student studies current problem areas of personnel and industrial relations.

Profs. Hobart and Marshall

Fall and Winter Qtrs.

45.261 Interpersonal Relations

(Prereq. 45.210 or consent of instructor) 4 Q.H.

An intensive inquiry into the communication from one person to another—the longest distance of all. Makes use of unconventional media for learning: selected films, drama, and the short story, in which universal qualities of the interactions between people are described, analyzed, and reinterpreted in different settings in today's world.

Prof. Rochwarg

Spring Qtr.

45.262 Collective Bargaining by Professional Associations

4 Q.H.

In recent years professional employees have become more numerous. They, in turn, have made the management of organizations more complex by introducing into the employment relationship the issue of professional self-determination of goals and responsibilities. Within professional associations such as engineering, teaching, nursing, and medicine, new structures have been formed for purposes of collective bargaining, as well as for more traditional economic reasons of salaries and working conditions. The purpose of the course is to compare these different structures and evaluate the impact of important social factors. These factors include: the development and present status of the profession, its level of autonomy, its self-image, and the market demand for its services. Case analyses, reading, guest lecturers, and independent research are utilized.

Prof. Hobart

Spring Qtr.

45.263 Career Planning and Managerial Skill Assessment

(Prereq. 45.209, 45.210 and consent of instructor) 4 Q.H.

Effective career planning and development can be viewed most profitably in the larger context of an individual's actualization process in life. On the one hand, the student explores his career with reference to personal values, interests, aspirations, sense of self-worth and managerial skills, and on the other, the realities of specific occupational and professional choices. During the course each participant provides and analyzes a wide variety of data for better insight into his career future and the specific steps leading to greater goal fulfillment. Designed for ninth- and tenth- quarter students.

Prof. Croke

Fall Qtr.

45.265 Production Management

(Prereq. 49.251) 4 Q.H.

Production management is concerned with planning and controlling the use of men, materials, facilities, technology, and information to accomplish the objectives of an organization. The course provides a basic understanding of the management of the production system—its design, operation, control, evolution, and modification—to enhance managerial decision making in technical matters. Topics discussed are: design of product and process, human factors concepts, capacity considerations, man-machine systems, work

measurement, wage administration, production planning, inventory management production control, and product quality management.

Profs. Ammer, Godin, Olive, and Shore

Spring Qtr.

45.267 Strategies of Organizational Change

(Prereq. 45.210 or consent of instructor) 4 Q.H.

Explores the problems encountered when organizations seek, or are forced, to change. The change process and its impact will be examined from both the individual's and the organization's perspectives. The aim of the course is to develop analytical and interpersonal skills and insights into the change process. In addition to readings and cases, teams of students will be expected to undertake a field study of an organization during a period of change. Non-business organization will be the primary but not exclusive focus of the course.

Staff

Spring Qtr.

45.268 Assessment of Prospective Employees

4 Q.H.

Deals in depth with specific factors utilized in hiring or evaluating workers, e.g., psychological tests, interviews, references, etc. Explores different techniques of using selection data and how to evaluate their effectiveness.

Prof. Pendleton

Spring Qtr.

45.269 Interpersonal Relations Through Transactional Analysis

(Prereq. 45.209, 45.210) 4 Q.H.

Using a simplified behavioral vocabulary, Transactional Analysis becomes a language and way of thinking about the nature of interpersonal relations. As an applied skill, Transactional Analysis teaches one how to improve communications and relationships between individuals. Transactional Analysis has been used as a training technique by dozens of companies in such areas as improving the interpersonal skills of customer-contact personnel, implementing affirmative action programs, and improving superior-subordinate relations.

Prof. Priem

Summer Qtr.

45.275 Labor Law

(Prereq. 45.260, 39.275) 4 Q.H.

The changing judicial principles and statutory standards of employment and management-union relations since 1800.

Staff

Fall and Winter Qtrs.

45.276 Seminar in Collective Bargaining

(Prereq. 45.275) 4 Q.H.

Cases or reports on problems faced by industrial relations departments dealing with employees through collective bargaining. Individual research.

Staff

Spring Qtr.

Also see course 49.262 for Independent Study.

International Business Administration

46.100 Introduction to International Business Administration

4 Q.H.

Survey of the concepts of international business. Focuses on the analysis of the cultural, economic and political aspects of domestic and foreign environments and their effect on the international operations of business firms. Topics covered include the principles, patterns and potential of international trade investments; the development of management strategies for international business; and the organization and management of the firm's international operations.

Prof. Verma

Fall and Winter Qtrs.

46.101 Seminar in International Business

(Prereq. 46.100) 4 Q.H.

Designed to provide an opportunity to bring the tools and information gained in previous courses to the task of solving significant managerial problems in international and foreign cultural contexts. Student reports form a major part of this course and are focused on either a

functional business area related to international operations or an analysis of market opportunity and methods of entry in a foreign environment.

Prof. Verma

Spring and Summer Qtrs.

46.102 Comparative International Management

4 Q.H.

The objective is to develop the conceptual and analytical abilities of the student in (1) identifying and analyzing management systems in differing national settings and (2) understanding the impact of economic, social, political, and cultural variables on management systems.

Spring and Summer Qtrs.

Transportation

48.101 Principles of Transportation

(Prereq. 39.105) 4 Q.H.

The political, social, and economic functions of transportation; development and structure of the domestic transportation system; the nature of government regulation and promotion of the several modes.

Prof. Lieb

Fall and Winter Qtrs.

48.102 Current Issues in Transportation Policy

(Prereq. 48.101) 4 Q.H.

An overview of the regulatory process and its impact on the domestic transportation system. Critical examination of topical policy issues which confront carriers, shippers, and the agencies of regulation.

Prof. Lieb

Spring and Summer Qtrs.

48.103 Carrier Management

(Prereq. 48.101) 4 Q.H.

The transportation system from the carrier's viewpoint; managerial response to a heavily regulated and rapidly expanding environment; focus on carrier decision making involving routes, scheduling, financing, and pricing of services.

Prof. Lieb

Fall and Winter Qtrs.

48.104 Physical Distribution Management

(Prereq. 43.120) 4 Q.H.

Movement, distribution, and control of raw material and finished goods flows. Examination of the importance of inventory control, scheduling, warehousing, and transportation in the design and operation of distribution systems.

Prof. Lieb

Spring and Summer Qtrs.

48.105 Urban Transportation

(Prereq. 39.105) 4 Q.H.

Impact of private and public transport systems on urban development. The planning and implementation of government programs concerning construction and promotion of system alternatives.

Prof. Lieb

Spring and Summer Qtrs.

48.106 Air Transportation

(Prereq. 48.101) 4 Q.H.

A managerial perspective on economics and regulation of commercial aviation; emphasis on routes, schedules, operations, and financing.

Staff

Fall and Winter Qtrs.

48.110 International Transportation and Distribution Management

(Prereq. 48.101) 4 Q.H.

Examines the present and future status of U.S. and world ocean and air transportation in international trade and development. The economic, regulatory, financial, and operating characteristics of these forms of carriage are examined with primary emphasis given to their impact on international trade patterns. Other topics include government promotion, subsidy, and technological innovation.

Staff

Fall and Winter Qtrs.

Also see course 49.262 for Independent Study.

General Business

49.100 Introduction to Business

4 Q.H.

The business organization as a system of interrelated functions and operations; the interactions between the organization and its environment; and the role of management in business organizations.

College of Business Administration Faculty

Fall and Winter Qtrs.

49.101 Introduction to the Computer

(Prereq. 10.125) 4 Q.H.

Provides the undergraduate business student with a basic computer capability. The student develops a familiarity with the computation center and experience in the use of canned programs. Skills developed are reinforced and augmented in core and elective courses in upper-class years.

Profs. Godin, Grossman, and Parsons

Fall and Winter Qtrs.

49.107 Management of Smaller Enterprises

4 Q.H.

A general management course that focuses upon the strategies and operating problems of smaller, already-established business enterprises. The course is designed for individuals who are considering entrepreneurial careers or careers in management, finance, or marketing within the smaller company environment. Discussion will explore the characteristics and urgencies of problems that smaller companies are likely to encounter at different stages in their evolving life cycle, from the post-natal period to the more mature stage.

Prof. Olive

Fall and Winter Qtrs.

49.108 Opportunity Identification and Analysis

4 Q.H.

Concerned with the essential tasks that are performed prior to the birth of a new venture. These include: finding a suitable business opportunity or developing an idea for a product or service; analyzing the feasibility of the opportunity; development of a business plan; structuring of the venture team; seeking sources of seed capital; and formation of a venture action plan leading to start-up of operations.

Prof. Olive

Fall Qtr.

49.109 Statistical Methods for Data Analysis

(Prereq. 49.205) 4 Q.H.

Examines some of the most commonly used methods for analyzing large and small quantities of data. Included are: 1. regression and correlation, 2. chi-square, 3. discriminant analysis, 4. factor analysis, 5. sampling, and 6. designing and analyzing experiments. Extensive use is made of laboratory (problem) sessions and of canned computer programs which require no previous computer experience.

Prof. Wiseman

Spring Qtr.

49.155 Legal Aspects of Business

4 Q.H.

The legal aspects of business transactions and business relationships involving contracts, negotiable instruments, and suretyship and guaranty.

Profs. Fiumara and Scioletti

All Qtrs.

49.156 Management Planning and Control

(Prereq. 41.105, 45.210) 4 Q.H.

Develops systematic and integrated framework of concepts and theory useful for consideration of management control, and for the design and implementation of management control systems. Integrates pertinent material from the formal disciplines, particularly those in organizational behavior, with "control." Develops skill in analyzing real-world situations involving management control considerations. Achieves higher level of understanding of the interrelated nature of the management control process with other processes operating within an organization and the broader functional areas of business. The course covers the following topics: basic conceptual framework, responsibility centers, measurement, expense centers, profit centers and transfer pricing, investment centers, planning and budgeting, control reporting, incentives for performance, organizational relationships (role of controller), and evaluation of comprehensive systems.

Prof. Caplan

Not offered 1974-75

49.205 Introduction to Data Processing

4 Q.H.

Manual, mechanical, and electronic methods of data processing; emphasis on computerized systems, flow charting techniques, and equipment capabilities and limitations.

Profs. Godin, Parsons, and Staff

Winter and Summer Qtrs.

49.206 Management Information Systems

(Prereq. 49.251) 4 Q.H.

The design and implementation of a computer-based management information system. Includes programming, flow diagramming, and documentation of business subsystems. A term project requirement provides experience with realistic design problems and computer application. Computer Model 6000 Series is used.

Prof. Gubellini

Fall and Winter Qtrs.

49.210 Law of Business Organization

(Prereq. 49.155) 4 Q.H.

The legal aspects of the typical forms of business ownership; the responsibility and liabilities between parties involved; legal requirements under the Securities Exchange Commission and bankruptcy procedures. Course covers agency, sole proprietorship, partnerships, corporations, employer-employee legal relationships, S.E.C. and bankruptcy procedures.

Profs. Fiumara and Scioletti

Fall and Winter Qtrs.

49.212 Law of Wills, Trusts and Estates

4 Q.H.

The requirements of a valid will, claims of and against the estate and final distribution of property. The requirements of a valid inter-vivos trust, a testamentary trust, the responsibilities and liabilities of a trustee, the rights of beneficiaries, and administration of an estate, both formal and informal. Course covers types of wills, types of trusts, and administration of an estate.

Prof. Scioletti

Spring Qtr.

49.213 Law of Sales (Consumer goods - personal property and bailments)

(Prereq. 49.155) 4 Q.H.

The law governing sales and secured transactions under the Uniform Commercial Code; the rights and liabilities of parties in transactions involving consumer goods, personal property and bailments. Course covers sales, secured transactions, consumer goods, personal property, and bailments.

Profs. Fiumara and Scioletti

Winter and Spring Qtrs.

49.216 Law of Real Estate - Property, Tenancy and Insurance (Prereq. 49.155) 4 Q.H.

The legal aspects required for a transfer of land, the leasing of property and the insurance coverage on such property, the Statute of Frauds requirements of a valid enforceable contract involving a sale of land or a sale of an interest in land. Course covers contracts involving land, contracts involving leasing, or renting of land, and property insurance on said property interests.

Profs. Fiumara and Scioletti

Winter and Spring Qtrs. 1975-76

49.240 Law in Society

4 Q.H.

Acquaints the student, as a member of society, with his legal rights, obligations, and responsibilities, applicable in his relationship with others and with the state. Tort actions involving some major areas such as assault and battery, trespass, negligence, slander, libel, and deceit as well as criminal actions involving major areas, such as homicide, assault and battery, robbery, arson, larceny, burglary, and self-defense.

Profs. Fiumara and Scioletti

Fall, Winter, and Spring Qtrs.

49.241 The Law of Bulk Transfers and Bankruptcy

4 Q.H.

In examining bulk transfers, a detailed study is made of the Uniform Commercial Code, Article 6; the need of the transferor to give to the transferee a sworn list of all his creditors; the giving of notice to the listed creditors; the contents of the notice, what creditors are protected; and the legal consequences of failure to comply with the Code. In examining bankruptcy, the course will deal with both voluntary and involuntary bankrupts; the acts of bankruptcy; the appointment and duties of the trustee; provable and dischargeable debts; priority of debts; discharge and acts which bar a discharge; the definition of bankrupts and their rights and responsibilities.

Prof. Fiumara

Winter and Spring Qtrs.

49.250 Quantitative Methods I

(Prereq. 10.125) 4 Q.H.

Topics treated are: descriptive statistics, statistical inference (probability), sampling, payoff table analysis, probability distributions, statistical estimation, hypothesis testing, and Bayesian statistics. The course is characterized by a decision-making orientation.

Profs. Godin, Grossman, Moriarty, Parsons, Shelley, and Wiseman Fall and Winter Qtrs.

49.251 Quantitative Methods II

(Prereq. 49.250) 4 Q.H.

The role of the model as an analytical device designed to aid the decision maker. Simple regression and correlation, multiple regression and correlation, exponential smoothing, linear programming, network models, and simulation models.

Profs. Godin, Grossman, Moriarty, Parsons, Shelley, and Wiseman

Spring and Summer Qtrs.

49.258 Accounting Systems and Data Processing

(Prereq. 41.112) 4 Q.H.

Information flows throughout the organization; the use of quantitative decision techniques in planning and control; the concept of the integrated and the total information system; and the applications of computer programming to business, nonprofit organizations, government, and other areas.

Prof. Grossman

Fall and Winter Qtrs.

49.261 Quantitative Models in Operations Analysis

(Prereq. 45.265) 4 Q.H.

The use of quantitative models for understanding problems in the management of complex systems. The course draws on linear programming, integer programming, transportation method, dynamic programming, simulation, and network analysis. These techniques are used in the following problem areas: capital investment, replacement, materials handling, line balancing, project scheduling, and planning and control.

Prof. Shore

Spring Qtr.

49.262 Independent Study

4 Q.H.

For a student who has received approval of a proposal to undertake independent study in lieu of any course required in the various concentrations. Each teaching area considers proposals presented by students to its Independent Studies Committee for evaluation and approval. Every proposal requires a detailed outline of the objectives and plan of study and must be accompanied by a supporting statement from the supervising faculty member under whose direction the study will take place. A copy of the final report prepared by the student will be presented to the appropriate Independent Studies Committee. Further information about the Independent Studies Program can be obtained from Area Coordinators.

College of Business Administration Faculty

All Qtrs.

Education Foundations

50.114 Education and Social Science

4 Q.H.

Introduction to the social scientific analysis of education and a brief exposure to the methods and thinking of these social sciences. The student should develop an orientation to and awareness of the complexity of the educational scene in America and the world today.

Staff

Fall and Winter Qtrs.

50.121 Human Development and Learning I

4 Q.H.

Developmental processes from prenatal life up to adolescence. Theories of learning and personality, with research and case material covering major aspects of psychological development.

Profs. Bernheim, Hanks, and Nichols

All Qtrs.

50.131 Human Development and Learning II

4 Q.H.

Continuation of Human Development and Learning I. Significant aspects of adolescence; physical, social, and psychological factors as they influence adolescent behavior.

Profs. Gulo and Rosenthal

All Qtrs.

50.132 Creative Expression in Children

(Prereq. 50.121) 4 Q.H.

Study of creativity and the role which creative expression plays in the psychological development of the young child. Examination of various media (i.e., visual, dramatic, photographic, literary) and their use in the educational setting.

Prof. Bernheim

Spring and Summer Qtrs.

50.133 Educational Applications of Social Psychology (Prereq. 50.121 or 50.131) 4 Q.H.

Focus on theory and research in social psychology especially relevant to education. Areas covered are: prejudice in the classroom; the school as a setting for manifestation of authoritarian personality; attitude organization and change in an educational environment; the class and the clique as "small groups;" the expression of need for achievement in various school structures; and related topics.

Prof. Hanks

Spring and Summer Qtrs.

50.134 Mental Health in Teaching

(Prereq. 50.121 or 50.131) 4 Q.H.

Factors involved in the choice of teaching as a career, and of psychological and occupational factors which contribute to teacher happiness and dissatisfaction, adjustment, and maladjustment. Examination of these factors is a background against which to consider: 1. what teachers can do to foster healthy personalities, 2. how to deal with psychological forces in the classroom, and 3. steps to strengthen the emotional development of the normal child.

Prof. Gulo

Spring and Summer Qtrs.

50.135 Cross-Cultural Studies of Child Rearing and Education

(Prereq. 50.121 or 50.131) 4 Q.H.

Patterns of socialization in contrasting cultures, and possible and/or demonstrated resultants in areas of personal development of concern to educators. Readings are mainly ethnographic studies of child rearing and psychological investigations of children from contrasting backgrounds.

Prof. Herzog

Spring and Summer Qtrs.

50.136 Language and Cognition: Educational Implications

(Prereq. 50.121 or 50.131) 4 Q.H.

Development of language and thought in the child: concept learning, problem solving, and language acquisition. Particular consideration given to the implications of current research and theory in these areas for educational practice.

Prof. Nichols

Spring and Summer Qtrs.

50.137 Seminar in Adolescent Psychology

(Prereq. 50.131) 4 Q.H.

An in-depth examination of the motivational, intellectual, social, and emotional development of adolescents from the end of pre-adolescence to the beginning of young adulthood. Emphasis is also on current issues such as drug use, sexual behavior, and vocational problems.

Prof. Gulo

Spring and Summer Qtrs.

50.138 Seminar in Human Learning and Motivation (Prereq. 50.121 or 50.131) 4 Q.H.

Survey and analysis of the literature on human learning and motivation. Emphasis on interaction between human learning and motivation in the developmental process and in the classroom.

Prof. Rosenthal

Spring and Summer Qtrs.

50.139 Seminar in Early Childhood Development

(Prereq. 50.121) 4 Q.H.

The theory and research regarding the cognitive, personality, and social development of children from birth to six years, with respect to their implications for early childhood education. Various existing programs examined and new directions explored.

Prof. Bernheim

All Qtrs.

50.141 Measurement and Evaluation

(Prereq. 51.135) 4 Q.H.

The fundamentals of measurement; the use of basic statistical concepts and techniques; evaluation of standardized and teacher-made tests.

Staff

All Qtrs.

50.142 Introduction to Educational Statistics

4 Q.H.

Emphasizes descriptive statistics useful in the evaluation of educational and related professional activities. Topics ordinarily covered include statistical notation, variability, probability, sampling techniques, linear regression, correlation, t-tests, and Chi-Square tests of significance. Examples of applications of these techniques will be drawn, so far as possible, from the fields for which students in the course are preparing, as this may vary from quarter to quarter.

Staff

All Qtrs.

50.152 Comparative Education

4 Q.H.

Education in other nations. Relationships with the political, economic, social, and cultural milieu in Western and Eastern Europe, the Near and Far East.

Prof. Baptiste

Fall, Winter, and Spring Qtrs.

50.153 Philosophy of Education

4 Q.H.

Objective is to help participants examine their own purposes in relation to those of the school as an institution. Philosophical writings (on topics such as the ethics of educational intervention, the delineation of educational concepts, the educational messages of long-range speculations and utopias, and normative assumptions underlying educational policies) and the practice of education in the class are the main materials. Dialogue is the main method.

Prof. Meier

Fall, Winter, and Spring Qtrs.

50.154 Current Issues in American Education

4 Q.H.

An analysis of the variety of educational issues confronting elementary and secondary teachers. Attempts will be made to place issues in a historical context, and to expose students to a variety of educational programs in the Boston area that are palpable efforts to deal with the issues.

Prof. Baptiste and Meier

Fall, Winter, and Spring Qtrs.

50.161 Seminar in Group Process

4 Q.H.

A study of the structure, dynamics, and function of face-to-face groups leading to learning about goal achievement and task orientation. The course operates mainly by committee or group instrumentation. A serious student should gain an understanding of the function of informal relationships within formal organizations, the various roles within groups, peer relationships, superior-subordinate relationships, authority and intimacy, and the inclusion and exclusion processes. Also involved is the aspect of self-understanding.

Prof. Meier

Winter and Spring Qtrs.

50.163 Schools as Social Systems

(Prereq. 50.114 or equiv.) 4 Q.H.

An analysis of schools as sociocultural subsystems within the larger society. Functional interrelationship between student and school subcultures; status and role systems; and authority structures in American schools.

Prof. Brown

Winter and Spring Qtrs.

50.164 Class and Ethnic Relations in Education

(Prereq. 50.114 or equiv.) 4 Q.H.

The various ways in which the American class system and patterns of ethnic group relations have affected, and have been affected by, American education. The limitations and potential of educational institutions with respect to the resolution of intergroup conflicts and the establishment of equal educational opportunities.

Prof. Zalinger

Winter and Spring Qtrs.

50.165 Organization and Politics of School Systems

(Prereq. 50.114 or equiv.) 4 Q.H.

The political sociology of school systems in the U.S. An analysis of the power and authority structures in contemporary education. Who decides what and how? Who controls the system? How are the various interest groups organized? What are the mechanisms for conflict resolution? The relationship between professional and nonprofessional interest groups.

Prof. Brown

Winter and Spring Qtrs.

50.166 Teaching and the Human Service Professions

(Prereq. 50.114 or equiv.) 4 Q.H.

An analysis of responsibility for socialization in modern society, focusing on the inputs of

teachers and other school personnel, various human service professions, and the family and informal peer groups. These topics are approached through sociological and historical materials concerning the development of selected school and human service professions, and by comparison of contemporary American practice with child-rearing arrangements in other modern nations.

Prof. Herzog

Winter and Spring Qtrs.

50.167 Education and Psychosocial Development (Prereq. 50.114 or equiv.) 4 Q.H.

Theories and research on the socialization functions of education. The relative influence of early vs. post-childhood socialization; professional and adult socialization; the role of diverse educational experiences and institutions in personality development and change.

Profs. Durham and Zalinger

Winter and Spring Qtrs.

50.168 Education and Social Change (Prereq. 50.114 or equiv.) 4 Q.H.

A sociological exploration of educational systems as independent and dependent variables in social change. Instances of planned educational change in various countries and their implications for contemporary American society.

Staff

Winter and Spring Qtrs.

Education—Instruction

51.124 Modern Mathematics Curricula

4 Q.H.

Mathematics curricula in junior and senior high schools, including experimental programs, presented in their historical setting.

Prof. McLean

Spring Qtr.

51.131 Fundamentals of Arithmetic I

4 Q.H.

Techniques of teaching arithmetic so that underlying principles are stressed. Topics are selected to serve as a foundation in mathematics appropriate for any elementary program. Deductive and inductive reasoning, numeration systems, elementary concepts of set theory, whole numbers and rational numbers and their properties, decimal numerals, linear equations, and inequalities.

Prof. Clark

Fall and Winter Qtrs.

51.132 Fundamentals of Arithmetic II

(Prereq. 51.131) 4 Q.H.

Continuation of Fundamentals of Arithmetic I. Rate, ratio and percent, informal geometry, elementary theorems and proofs, similarity and trigonometry, area of volume, elements of spherical geometry.

Prof. Clark

Spring and Summer Qtrs.

51.135 Analysis of Teaching and Educational Process

(Prereq. 50.131) 4 Q.H.

The relationships that exist between instructional objectives and teaching behavior; applications of human development and learning concepts as they relate to subsequent specialized teaching methods and materials. Research results and promising theory are used to extend the prospective teacher's concepts of the teaching function.

Staff

Fall and Winter Qtrs.

51.139 Writing and the Teaching of Writing

(Prereq. 51.135) 4 Q.H.

A study of the logical and rhetorical bases of exposition and argumentative writing; the role of definition in exposition and argumentation; relationships of assumptions, assertions, and implications; the nature of proof in the sciences, social sciences, and the humanities; strategies of argumentation; the affective consequences of word choice and sentence structure.

Prof. Favat

Spring Qtr.

51.140 Methods and Materials of Teaching Modern Languages I (Prereq. 51.135) 4 Q.H.

The most effective types of classroom activities, subject unit organization, assignments, examinations, and teaching aids used in modern language. The role of the language laboratory with its problems of selecting equipment, scheduling pupils, planning tapes and

content of drill exercises, evaluating results, and coordinating its functions with conventional classroom instruction.

Prof. Petralila

Fall and Winter Qtrs.

51.141 Elementary Education Compendium I

(Prereq. 51.135) 4 Q.H.

The curriculum is analyzed on the basis of the overall objectives of the American elementary school. Students evaluate and organize units of work which are appropriate to the level at which they plan to teach. The integrated approach to learning is emphasized, but the integrated approach to science, social studies, and language arts subjects is given special attention.

Prof. Lee in charge

Fall and Winter Qtrs.

51.142 Elementary Education Compendium II

(Prereq. 51.141) 4 Q.H.

The objectives, activities, and methods of evaluation in the elementary school are continued, with special attention to the areas of music, art, and physical education.

Prof. Lee in charge

Spring and Summer Qtrs.

51.143 Methods and Materials of Teaching English

(Prereq. 51.135) 4 Q.H.

An introduction to the structure and functions of language as they apply to the teaching of English; curriculum and planning in English. The unit approach; specific techniques of teaching reading and literature, grammar and usage, written and oral composition, listening, spelling, vocabulary, and the use of mass media.

Prof. Favat

Fall and Winter Qtrs.

51.144 Methods and Materials of Teaching Modern Languages II (Prereq. 51.140) 4 Q.H.

Continuation of Methods and Materials of Teaching Modern Languages I.

Prof. Petralia

Spring and Summer Qtrs.

51.145 Methods and Materials of Teaching Mathematics

(Prereq. 51.135) 4 Q.H.

Theory and practice of teaching secondary mathematics, including a discussion and evaluation of instructional problems. Lesson planning and presentations by individual students afford appropriate practice and serve as the medium of instruction.

Prof. McLean

Fall and Winter Qtrs.

51.147 Methods and Materials of Teaching the Sciences

(Prereq. 51.135) 4 Q.H.

The prospective science teacher is introduced to the following: the philosophies of science and their applicability in society and the secondary school; science curriculum development and application; and pertinent methods and materials in science education.

Prof. Miner

Fall and Winter Qtrs.

51.149 Methods and Materials of Teaching Social Studies

(Prereq. 51.135) 8 Q.H.

A field-oriented course conducted off campus in one or more schools of cooperating public school systems where College of Education students work with pupils of the school individually and in small groups. Techniques of planning, development of curriculum materials, utilization of audio-visual equipment, simulations, development and implementation of evaluation instruments, presentation of original materials in class.

Prof. Tedesco

Fall and Winter Qtrs.

51.151 Student Teaching and Seminar

(Prereq. Formal acceptance into and completion of Advanced Professional sequence with minimum 2.0 Q.P.A., both overall and in teaching major) 8 Q.H.

Full-time participation in a university-arranged and supervised school program designed to provide opportunity for the analysis of learning and teaching and for the demonstration, evaluation, and development of teaching skills.

Education—Reading

54.126 Teaching Reading in Secondary Schools

4 Q.H.

For English and Social Studies majors in the College of Education who are preparing for

teaching in the junior or senior high schools. Basically, the same approach and organization applies to this course as to the elementary level course. (One quarter)

Prof. Maguire

Spring Qtr.

54.135 Fundamentals of Reading I

6 Q.H.*

The basic, introductory course in developmental reading for prospective elementary teachers. In the first term the emphasis is on language and symbolic process as it relates to beginning reading. The word recognition and meanings growth areas are studied in detail, as are some methods and techniques of testing and grouping. An introduction to some reading books and materials, methods of teaching, and the psychology of learning to read. Tutorial work begins with students.

Prof. Howards

Fall and Winter Qtrs.

54.136 Fundamentals of Reading II

(Prereq. 54.135) 6 Q.H.*

A continuation and extension of the first term. Study skills; speed and fluency growth areas. The tutorial work is extended and greater familiarity with books, materials, and methods achieved.

Prof. Howards

Spring and Summer Qtrs.

54.141 Remedial Reading

(Prereq. 54.136) 4 Q.H.

For prospective teachers in the primary unit. This introductory course familiarizes the student with some of the most commonly known reading problems in the typical classroom as well as in the reading clinic; analysis and evaluation of the typical diagnoses of such problems; corrective programs. Tutorial work with a retarded reader, with each student keeping a log or journal of his work with a particular reading problem.

Prof. Burg

Fall and Winter Qtrs.

54.142 Linguistics and Reading

(Prereq. 54.136) 4 Q.H.

For elementary level teachers (primary unit). The major objective is to translate the knowledge gathered from structural and descriptive linguistics into useful classroom instruction, which includes not only reading instruction, but basic instruction in the related language skills. The contributions, particularly of such writers as Fries, Barnhart, Bloomfield, and LeFevre, are experimented with and analyzed.

Prof. Kaufman

Spring Qtr.

54.151 Children's Literature

(Prereq. 54.136) 4 Q.H.

For prospective teachers in the primary unit. A comprehensive survey and critical analysis of the books and materials available for basic reading instruction and for supplementary reading activities. After a massive review of the available literature for the children, especially in grades K-3, each student is responsible for developing some material of his own for trial with subjects. The ultimate goal is to make the student aware of what is available and how to use it most effectively in a reading program.

Prof. Buffone

Spring Qtr.

Education—Speech and Hearing

55.122 Introduction to Speech and Hearing

4 Q.H.

An overview of disorders of speech and hearing and their treatment. A review of normal speech and hearing development.

Staff

Spring and Summer Qtrs.

55.123 Speech Science

(Prereq. 55.122) 4 Q.H.

An understanding of the basic sciences involved in speech and audition. An in-depth study of the analysis of sound and the acoustic composition of speech. Emphasis is placed upon a review of the current theory and research in speech reception, perception, and production.

Staff

Fall and Winter Qtrs.

*Including lab.

- 55.124 Anatomy Physiology of Auditory Mechanisms** (Prereq. 55.122) 4 Q.H.
An in-depth study of the normal ear structure as well as its abnormalities and pathologies. Basic principles of the psychophysics of audition will be discussed.
Staff Fall and Winter Qtrs.
- 55.126 Anatomy and Physiology of Vocal Mechanisms** (Prereq. 55.122) 4 Q.H.
An in-depth study of the static structures, musculature and physiology of the speech mechanism. Current research in speech physiology will be emphasized.
Staff Spring and Summer Qtrs.
- 55.131 Developmental Semantics and Syntax** (Prereq. 55.122) 4 Q.H.
An analysis of the emerging semantic and syntax aspects of language in normal and atypical children. Discussion of current theory and research in language acquisition will be stressed.
Staff Fall and Winter Qtrs.
- 55.133 Phonetics and Developmental Phonology** (Prereq. 55.123) 4 Q.H.
A basic training in auditory recognition and symbolization of phonemes and allophones in major American dialects. Static and dynamic articulatory descriptions will be stressed. A review of the developmental sequence of phonemic acquisition.
Staff Spring and Summer Qtrs.
- 55.141 Phonemic Disorders** (Prereq. 55.126, 55.131, and 55.133) 4 Q.H.
A practical and theoretical understanding of the etiology of phonemic disorders; diagnostic tools for evaluation and methods of treatment.
Staff Spring and Summer Qtrs.
- 55.142 Introduction to Audiology** (Prereq. 55.123) 4 Q.H.
The basic techniques of audiometric testing and hearing conservation. A review of basic hearing sciences included.
Staff Fall and Winter Qtrs.
- 55.143 Diagnostic Techniques** (Prereq. 55.126, 55.133) 4 Q.H.
A presentation and review of diagnostic tests and procedures in speech pathology. Emphasis on the parent interview, the oral examination, and the appraisal of phonemic, phonatory, language, fluency, and auditory disorders.
Staff Spring and Summer Qtrs.
- 55.144 Orientation to Clinical Practices** (Prereq. Senior status) 4 Q.H.
Designed to introduce the student to the workings of the Hearing, Language and Speech Center. The student will be exposed, through direct observation, to the interpersonal aspects of communication in therapeutic relationships.
Staff Spring and Summer Qtrs.
- 55.154 Fluency Disorders** (Prereq. 55.126) 4 Q.H.
Stresses the nature, theories, and treatment of fluency disorders.
Staff Fall and Winter Qtrs.
- 55.155 Clinical Practice and Seminar** (Prereq. 55.144) 8 Q.H.
Provides the student with his initial involvement in the clinician-client relationship.
Staff Fall and Winter Qtrs.

Education—Special Education and Rehabilitation

- 56.120 Introduction to Special Education** 4 Q.H.
Survey course which emphasizes the characteristics and needs of exceptional children and youth. Recognition of exceptional children in the classroom, including the trainable and educable retarded, emotionally disturbed, social offender, brain-injured, speech-, hearing-, and language-impaired, the physically handicapped, the visually handicapped, and the gifted.
Staff Fall and Winter Qtrs.

56.121 Introduction to Learning Disabilities

(Prereq. 55.121) 4 Q.H.

The learning problems of children with perceptual-motor handicaps, but who generally meet the criteria of normal intelligence.

Staff

Fall and Winter Qtrs.

56.124 Diagnostics in Special Education (Prereq. 56.121, 56.130, Senior status) 4 Q.H.

Emphasis is on the assessment of the abilities of the handicapped student and the interpretation of test results. A major focus is on the interpretation of test results for the classroom teacher, prescriptive teaching, and educational remediation. The student will become acquainted with the WISC, the ITPA, and other frequently used diagnostic tests.

Staff

Fall and Winter Qtrs.

56.126 Methods and Materials of Teaching in Special Education

(Prereq. 56.120, 56.150, 56.124, Senior status) 4 Q.H.

The approaches and techniques used in Special Education to provide for the assessment, diagnosis, and prescriptive teaching for the atypical (mentally or physically handicapped) student. Roles of the specialist, resource personnel, and teacher will be examined. Clinical observation and tutoring may well be incorporated in this course.

Staff

Spring Qtr.

56.130 Introduction to Emotional Disturbances in Children

(Prereq. 55.121, 19.201, or equiv.) 4 Q.H.

An introduction to the etiology, dynamics, and diagnosis of emotional disturbance in children. Special attention is given to emotional blocks to learning.

Staff

Spring and Summer Qtrs.

56.135 Socio-Psycho Dynamics of Family Life

(Prereq. 56.121, 56.130, Senior status) 4 Q.H.

An introduction to and survey of the internal and external dynamics of family life. The significance of such dynamics to the mental health of the handicapped child will be examined. The approaches to working with parents and the school-home interrelationships will be explored.

Staff

Fall and Winter Qtrs.

56.140 Psychology of the Mentally Retarded

(Prereq. 55.121) 4 Q.H.

Analysis of the nature and needs of the retarded individual, with emphasis on characteristics of physical, mental, social, and emotional development. Implications of these characteristics for educational, social, and employment training programs are explored in conjunction with parental and community reactions and involvement. The positive ultimate role of the retarded as a successful citizen, employee, and homemaker is a major emphasis.

Staff

Spring and Summer Qtrs.

56.150 Introduction to Rehabilitation

(Prereq. 55.121) 4 Q.H.

Overview of and an orientation to the field of rehabilitation, including its historical development, psychological implication, and sociological dimensions.

Staff

Spring and Summer Qtrs.

Physical Education

Most courses are coeducational. Some courses for men and women will offered separately where deemed advisable.

60.230 Advanced Teaching and Analysis

(Prereq. 60.140, 60.141, 60.142; women only) 3 Q.H.*

Advanced study of teaching methods and analysis in one of the areas studied in Physical Education 60.140-42 and one individual sport.

Staff

Winter and Spring Qtrs.

*Including lab.

61.212 Handball and Squash

(Prereq. Men only) 1 Q.H.*

The skills and techniques involved in the teaching of handball and squash. Special emphasis on skills involved, rules, courtesies, and strategies in each sport.

Staff

Fall and Winter Qtrs.

61.241 Advanced Wrestling (Prereq. 61.240 or consent of instructor; men only) 2 Q.H.*

Advanced techniques in coaching wrestling at the senior high school and college levels; emphasis on fundamentals of a more advanced nature; care of athletes, officiating, conduct of meets.

Staff

Spring and Summer Qtrs.

61.242 Advanced Boxing (Prereq. 61.240 or consent of instructor; men only) 2 Q.H.*

Advanced techniques in coaching boxing; emphasis on offensive and defensive techniques, rules, and officiating.

Staff

Spring and Summer Qtrs.

61.265 Advanced Football (Prereq. 61.236 or consent of instructor; men only) 3 Q.H.*

Basic techniques in coaching football at the senior high school and college levels. Emphasis on individual and team play, offensive and defensive systems, role of head and assistant coaches, scouting, use of teaching aids, team management.

Staff

Spring and Summer Qtrs.

61.266 Advanced Basketball (Prereq. 61.235 or consent of instructor; men only) 3 Q.H.*

Basic techniques at the senior high school and college levels. Emphasis on systems of offensive and defensive team play, scouting, use of teaching aids, team management.

Staff

Spring and Summer Qtrs.

61.267 Advanced Baseball (Prereq. 61.235 or consent of instructor; men only) 3 Q.H.*

Basic techniques in coaching baseball at the senior high school and college levels. Emphasis on individual and team play, role of head and assistant coaches, team management.

Staff

Spring and Summer Qtrs.

61.268 Advanced Track (Prereq. 61.236 or consent of instructor; men only) 3 Q.H.*

Basic techniques of coaching track and field at the senior high school and college levels. Emphasis on care and training of athletes, practice schedules, coaching techniques, conduct of meets.

Staff

Spring and Summer Qtrs.

62.10A Beginning Swimming

1 Q.H.*

Instruction in basic swimming skills, with emphasis on personal water safety.

Staff

All Qtrs.

62.10B Intermediate Swimming

(Prereq. 62.10A or equiv.) 1 Q.H.*

Instruction in basic and advanced swimming skills, with emphasis on form and efficiency.

Staff

All Qtrs.

62.10C Advanced Swimming

(Prereq. 62.10B or equiv.) 1 Q.H.*

Instruction in advanced swimming skills, with emphasis on form and efficiency.

Staff

All Qtrs.

62.10D Diving

(Prereq. 62.10A or equiv.) 1 Q.H.*

Instruction in basic one-meter and three-meter springboard diving in all five categories of dives.

Staff

All Qtrs.

62.10E Competitive Swimming

(Prereq. 62.10B or equiv.) 1 Q.H.*

Instruction in the four competitive strokes, starts, and turns, with emphasis on speed and conditioning.

Staff

Winter and Summer Qtrs.

62.10F Synchronized Swimming

(Prereq. 62.10B or equiv.) 1 Q.H.*

Instruction in basic synchronized swimming skills, with emphasis on stunts, rhythmic swimming, and choreography.

Staff

Winter and Spring Qtrs.

- 62.10G Water Polo** (Prereq. 62.10B or equiv.) 1 Q.H.*
Instruction in beginning water polo, with emphasis on personal skill, offensive and defensive team play.
Staff Fall and Spring Qtrs.
- 62.10J Survey of Aquatic Activities** (Prereq. 62.10B or equiv.) 1 Q.H.*
Competitive swimming, diving, skin diving, synchronized swimming, and water polo, with emphasis on recreational values.
Staff All Qtrs.
- 62.10K Senior Life Saving** (Prereq. 62.10B or equiv.) 1 Q.H.*
Instruction in life-saving skills, or techniques and theory. Red Cross Certification possible.
Staff All Qtrs.
- 62.10L Water Safety Instruction** (Prereq. 62.10B, 62.10K) 1 Q.H.*
Instruction in techniques, theory and teaching methods in swimming and life-saving courses. Red Cross Certification possible.
Staff Spring Qtr.
- 62.10M Beginning Scuba** (Prereq. 62.10B or equiv.) 1 Q.H.*
Instruction in basic skin diving and scuba diving skills, with emphasis on personal safety.
Staff All Qtrs.
- 62.10P Canoeing** (Prereq. 62.10B or equiv.) 1 Q.H.*
Instruction in basic canoeing skills.
Staff Fall and Summer Qtrs.
- 62.10Q Sailing** (Prereq. 62.10B or equiv.) 1 Q.H.*
Instruction in rowing and in basic sailing skills.
Staff Fall and Summer Qtrs.
- 62.10S Advanced Beginning Swimming** 1 Q.H.*
Continuation of elementary swimming. Emphasis on basic stroke improvement and understanding and gaining confidence in deep water.
Staff All Qtrs.
- 62.12A Beginning Folk and Square Dance** 1 Q.H.*
Introduction to folk and square dance at the beginning and intermediate levels.
Staff Fall Qtr.
- 62.12B Intermediate Folk and Square Dance** (Prereq. 62.12A or equiv.) 1 Q.H.*
Instruction in folk and square dance at the intermediate and advanced levels.
Staff Winter and Spring Qtrs.
- 62.12C Ethnic Dance Forms** (Prereq. 62.12A or consent of instructor) 1 Q.H.*
A study of primitive, folk, and national dance forms.
Staff Spring Qtr.
- 62.12E Modern Dance I** 1 Q.H.*
Introduction to modern dance technique and improvisation.
Staff Fall and Winter Qtrs.
- 62.12F Modern Dance II** (Prereq. 62.12E or equiv.) 1 Q.H.*
A continuation of 62.12E with progression to more complex modern dance techniques and movement combinations. Practice in the use of improvisation for exploring dance movement.
- 62.12G Modern Dance III** (Prereq. 62.12F or equiv.) 1 Q.H.*
A continuation of 62.12F. Progression into the expressive and choreographic use of modern dance techniques.
- 62.12H Ballet I** 1 Q.H.*
Introduction to the fundamentals of Classical Ballet; its vocabulary, structure, placement, and style.

*Including lab.

62.12J Ballet II

(Prereq. 62.12H or equiv.) 1 Q.H.*

A continuation of 62.12H. Progression into the expressive and choreographic use of classic ballet techniques.

Staff

Winter Qtr.

62.12L Jazz Dance I

1 Q.H.*

Exploring the basics of jazz dance techniques through the rhythmic, lyrical, and rock jazz styles.

62.12M Jazz Dance II

(Prereq. 62.12L or equiv.) 1 Q.H.*

An in-depth exploration of the lyrical jazz dance style. Technique evolved by Luigi.

62.12N Jazz Dance III

(Prereq. 62.12M or equiv.) 1 Q.H.*

A continuation of 62.12M and progression into the choreographic process of jazz dance.

62.12R Ballroom Dance

1 Q.H.*

An introduction to traditional and contemporary ballroom dance.

62.13P Beginning Gymnastics Orientation

1 Q.H.*

Development of knowledge and skill necessary for competent performance in the orientation skills of tumbling, trampoline, and vaulting at the beginning level. Coed.

62.13Q Beginning Men's Apparatus

(Prereq. 62.13P or equiv.; men only) 1 Q.H.*

Development of knowledge and skill for competent performance at the beginning level pommel horse, parallel bars, horizontal bars, and rings.

62.13R Beginning Women's Floor Exercise and Apparatus

(Prereq. 62.13P or equiv.; women only) 1 Q.H.*

Development of knowledge and skill for competent performance in floor exercise, and beginning bars and uneven parallel bars.

62.13S Intermediate/Advanced Women's Gymnastics

(Prereq. 62.13P, 62.13R, or equiv.) 1 Q.H.*

Development of skill and knowledge of the four women's competitive areas of gymnastics for a combined performance level of 9.0 for intermediate and 12.0 for advanced credit. These scores are based on the F.I.G. Code of Points.

62.13T Intermediate/Advanced Men's Gymnastics (A)

1 Q.H.*

Development of skill and knowledge of the six men's competitive areas of gymnastics for a combined performance level of 12.0 for intermediate and 15.0 for advanced credit. These scores are based on the F.I.G. Code of Points.

62.13U Intermediate/Advanced Men's Gymnastics (B)

1 Q.H.*

Designed to further develop the skills and knowledge in the six areas of men's competitive gymnastics at the intermediate and advanced level. Based on the F.I.G. Code of Points.

62.14A Beginning Badminton

1 Q.H.*

Instruction in beginning badminton skills, rules, strategy, and care of equipment.

Staff

Spring and Summer Qtrs.

62.14B Beginning Squash Racquets

1 Q.H.*

Introduction to squash racquets at the beginning level; development of skills, rules strategy, and etiquette.

Staff

Fall and Winter Qtrs.

62.14C Beginning Tennis

1 Q.H.*

Instruction in beginning tennis skills, rules, strategy, and care of equipment.

Staff

Spring and Summer Qtrs.

62.14D Indoor Tennis

1 Q.H.*

Introduction to tennis at the beginning level through the use of paddles and racquets in modified game situations; development of skill, rules, strategy and etiquette. (Does not fulfill skill requirement in Physical Education major curriculum.)

Staff

All Qtrs.

*Including lab.

62.14E Intermediate/Advanced Badminton

(Prereq. 62.14A or equiv.) 1 Q.H.*

Instruction in badminton, including intermediate and advanced skills, with emphasis on singles and doubles match play and strategy.

Staff

Spring Qtr.

62.14G Intermediate/Advanced Tennis

(Prereq. 62.14C or equiv.) 1 Q.H.*

Instruction in tennis, including intermediate and advanced skills, with emphasis on singles and doubles match play and strategy.

Staff

Summer Qtr.

62.15A Fundamentals of Movement

1 Q.H.*

Understanding and performance of basic motor and sports. Efficient and effective movement for sports activities and daily living is stressed.

Staff

Fall Qtr.

62.15B Beginning Archery

1 Q.H.*

Selected skills in target shooting and practical experience in archery games, novelty events, and conduct of tournaments.

Staff

All Qtrs.

62.15D Beginning Bowling

1 Q.H.*

Development of knowledge and skill necessary for competent performance in bowling at the beginning level. Practice provided in nearby commercial alleys. *Lab. fee.*

Staff

All Qtrs.

62.15F Beginning Golf

1 Q.H.*

Instruction in fundamental golf skills, knowledge of clubs and their uses, and rules and etiquette. Indoor only during winter season.

Staff

All Qtrs.

62.15G Intermediate/Advanced Golf

(Prereq. 62.15F or equiv.) 1 Q.H.*

Instruction in golf at the Intermediate-advanced level. Emphasis is placed on course play, rules, and selection of equipment. *Lab. fee.*

Staff

Fall and Summer Qtrs.

62.15H Beginning Judo

1 Q.H.*

A survey of the principles and fundamental skills of judo. Instruction is geared to the beginning and intermediate levels.

Staff

All Qtrs.

62.15J Beginning Boxing

(Prereq. Men only) 1 Q.H.*

Instruction in boxing at the beginning level; emphasis on offensive and defensive techniques, scoring, training, and officiating.

Staff

All Qtrs.

62.15K Beginning Wrestling

(Prereq. Men only) 1 Q.H.*

Beginning level of instruction in basic wrestling maneuvers. Stress on fundamental breakdowns, escapes, takedown, rides, and pinning combinations. Rules and scoring procedures discussed and modified matches conducted.

Staff

All Qtrs.

62.15L Intermediate/Advanced Wrestling

(Prereq. 62.15K or equiv.; men only) 1 Q.H.*

Intermediate-advanced levels of instruction presented. Emphasis is placed on training and training principles; selected skills not covered in beginning wrestling, scrimmages, and officiating.

Staff

Fall and Winter Qtrs.

62.15M Beginning Fencing

1 Q.H.*

Instruction in basic foil fencing, including introduction to competition.

Staff

Spring Qtr.

*Including lab.

62.15N Intermediate/Advanced Foil Fencing

(Prereq. 62.15M or equiv.; women only) 1 Q.H.*

Instruction in intermediate-advanced techniques of foil fencing, with special emphasis on competition, judging, and the use of electrical equipment.

Staff

Spring Qtr.

62.15P Three Weapon Fencing

(Prereq. 62.15M or equiv.; men only) 1 Q.H.*

Instruction in intermediate-skill techniques of foil and beginning work in epee and sabre fencing, with special emphasis on competition, judging, and the use of electrical equipment.

Staff

Spring Qtr.

62.16B Weight Training

(Prereq. Men only) 1 Q.H.*

Introduction to the principles and use of resistive exercises; isotonic exercise (weights), isometric, and the appropriateness of each.

Staff

Fall, Winter, and Spring Qtrs.

62.16C Physical Conditioning

1 Q.H.*

Instruction in basic exercise and conditioning techniques. Special emphasis on individual needs for exercise and activity. The relationships of diet and relaxation to exercise are discussed.

Staff

All Qtrs.

62.16D Exercise and Figure Control

(Prereq. Women only) 1 Q.H.*

Instruction and guidance in contouring, fitness, and poise. (Does not fulfill skill requirement in Physical Education major curriculum.)

Staff

All Qtrs.

62.16E Adapted Physical Education I

(Prereq. Medical consent) 1 Q.H.*

A course designed for students whose physical activity program must be modified for medical reasons. Personalized instruction and programs are provided according to individual needs.

Staff

All Qtrs.

62.16G Principles of Physical Activities and Conditioning

2 Q.H.*

Survey of the physiological principles, concepts, and applications of skills concerned with individual or group fitness programs. (Not open to Physical Education majors.)

Staff

All Qtrs.

62.16H Ski Conditioning

1 Q.H.*

Instruction in skills and techniques for the development of strength, endurance, flexibility, and efficient use of body for skiing. (Does not fulfill skill requirement in Physical Education major curriculum.)

Staff

Fall and Winter Qtrs.

62.16J Beginning Skiing and Winter Sports

2 Q.H.*

Instruction in fundamental techniques of skiing, skating, and tobogganing. *Lab. fee.*

Staff

Winter Qtr.

62.16K Intermediate/Advanced Skiing and Winter Sports

(Prereq. 62.16J or equiv.) 2 Q.H.*

Instruction in skiing and skating at the intermediate-advanced level. Emphasis placed on skills, teaching, techniques, and safety procedures. *Lab. fee.*

Staff

Winter Qtr.

62.16L Beginning Track and Field

1 Q.H.*

Instruction in the fundamental skills in the various track and field events.

Staff

Spring Qtr.

62.16M Intermediate/Advanced Track and Field

(Prereq. 62.16L or equiv.) 1 Q.H.*

Instruction in intermediate-advanced techniques in track and field events. Emphasis is placed on improvement of individual skills; techniques of officiating are discussed.

Staff

Spring and Summer Qtrs.

*Including lab.

62.16P Beginning Handball

(Prereq. Men only) 1 Q.H.*

Development of knowledge and skills necessary for competent performance in handball at the beginning level.

Staff Fall and Winter Qtrs.

62.16Q Intermediate/Advanced Handball

(Prereq. 62.16P or equiv.; men only) 1 Q.H.*

Development of knowledge and skills necessary for competent performance in handball at the intermediate to advanced levels.

Staff Winter Qtr.

62.17C Beginning Basketball

1 Q.H.*

Development of knowledge and skills necessary for performance in basketball at the beginning level.

Staff Fall and Winter Qtrs.

62.17D Intermediate/Advanced Basketball

(Prereq. 62.17C or equiv.) 1 Q.H.*

Development of knowledge and skills necessary for performance in basketball at the intermediate to advanced levels.

Staff Fall and Winter Qtrs.

62.17F Beginning Ice Hockey

(Prereq. Consent of instructor) 1 Q.H.*

Development of knowledge and skills necessary for performance in ice hockey at the beginning levels. Candidates must be able to skate forward and backward and cut right and left for admission.

Staff Fall and Winter Qtrs.

62.17G Intermediate/Advanced Ice Hockey

(Prereq. 62.17F or equiv.; men only) 1 Q.H.*

Development of knowledge and skills necessary for performance in ice hockey at the intermediate to advanced levels.

Staff Fall and Winter Qtrs.

62.17J Beginning Volleyball

1 Q.H.*

Development of knowledge and skill for performance in volleyball at the beginning level.

Staff Fall and Winter Qtrs.

62.17K Intermediate/Advanced Volleyball

(Prereq. 62.17J or equiv.) 1 Q.H.*

Development of knowledge and skill for performance in volleyball at the intermediate to advanced levels.

Staff Fall and Winter Qtrs.

62.17L Beginning Field Hockey

(Prereq. Women only) 1 Q.H.*

Development of knowledge and skill for competent performance in field hockey at the beginning level.

Staff Fall and Winter Qtrs.

62.17M Intermediate Field Hockey

(Prereq. 62.17L or equiv.; women only) 1 Q.H.*

Development of knowledge and skill for competent performance in field hockey at the intermediate to advanced levels.

Staff Fall and Winter Qtrs.

62.17N Flag Football

(Prereq. Men only) 1 Q.H.*

Development of fundamentals of football through noncontact work at the beginning level. Position play, passing, catching, running.

Staff Fall and Winter Qtrs.

62.17P Beginning Football

(Prereq. Men only) 1 Q.H.*

Development of fundamental football skills and knowledge to the beginning level of competence.

Staff Fall and Winter Qtrs.

62.17Q Intermediate/Advanced Football

(Prereq. 62.17P or equiv.; men only) 1 Q.H.*

Development of football knowledge and skill necessary for competent performance in football at the intermediate to advanced levels.

Staff Fall and Winter Qtrs.

62.18C Beginning Softball

1 Q.H.*

Development of knowledge and skill necessary for competent performance in softball at the beginning level.

Staff

Spring and Summer Qtrs.

62.18D Intermediate/Advanced Softball

(Prereq. 62.18C; women only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in softball at the intermediate to advanced level.

Staff

Spring and Summer Qtrs.

62.18E Baseball

(Prereq. 62.18C or equiv.; men only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in baseball at the intermediate to advanced levels.

Staff

Spring and Summer Qtrs.

62.18G Beginning Lacrosse

(Prereq. Women only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in lacrosse at the beginning level.

Staff

Spring and Summer Qtrs.

62.18H Intermediate/Advanced Lacrosse

(Prereq. 62.18G or equiv.; women only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in lacrosse at the intermediate to advanced levels.

Staff

Spring and Summer Qtrs.

62.18J Beginning Lacrosse

(Prereq. Men only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in lacrosse at the beginning level.

Staff

Spring and Summer Qtrs.

62.18K Intermediate/Advanced Lacrosse

(Prereq. 62.18J or equiv.; men only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in lacrosse at the intermediate to advanced levels.

Staff

Spring and Summer Qtrs.

62.18M Beginning Soccer

(Prereq. Women only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in soccer at the beginning level.

Staff

Spring and Summer Qtrs.

62.18N Intermediate/Advanced Soccer

(Prereq. 62.18M or equiv.; women only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in soccer at the intermediate to advanced levels.

Staff

Spring and Summer Qtrs.

62.18Q Beginning Soccer

(Prereq. Men only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in soccer at the beginning level.

Staff

Spring and Summer Qtrs.

62.18R Intermediate/Advanced Soccer

(Prereq. 62.18Q or equiv.; men only) 1 Q.H.*

Development of knowledge and skill necessary for competent performance in soccer at the intermediate to advanced levels.

Staff

Spring and Summer Qtrs.

62.18T Selected Field Sports

(Prereq. Women only) 1 Q.H.*

Development of knowledge and skill in speedball, speedaway, and flag football.

Staff

Spring and Summer Qtrs.

62.18V Selected Field Sports

(Prereq. Men only) 1 Q.H.*

Development of knowledge and skill in speedball and speedaway.

Staff

Spring and Summer Qtrs.

*Including lab.

62.19A Early Childhood Motor Skill Development

2 Q.H.*

A study of the development of fundamental motor patterns (run, catch, kick, strike, jump, throw) from age 0 to 10 years, including perceptual motor organizations of vision, audition, and proprioception.

Staff

Fall and Winter Qtrs.

62.19B Games and Activities for Children

2 Q.H.*

Introduction to simple ball games, running and tag games, self-testing activities, movement exploration, and rhythms appropriate for children. Course content appropriate for future parents, teachers, and youth leaders.

Staff

Fall and Winter Qtrs.

62.19D The Spectator and Sports (Pass/Fail)

1 Q.H.

Instruction in the understanding for enjoyment as a spectator of such sports as football, basketball, ice hockey.

Staff

All Qtrs.

62.19G Perceptual Motor Training Programs

2 Q.H.*

An introduction to the role motor activities play in enhancing perceptual development. An examination of some current training programs: Frostig, Kephart, Doman-Delacato, Winter-Haven.

Staff

Spring Qtr.

62.201 Human Movement

4 Q.H.*

An introduction to the nature and role of human movement and the analysis of skillful movement performance through participation and observation. Introduction to the objectives, literature, and organization of the profession of physical education.

Staff

Fall Qtr.

62.203 Practicum in Group Dynamics

(Prereq. 62.201) 4 Q.H.

A three-week residence group living experience at the Warren Center. An introduction in group dynamics through selected activities, discussion, living and working together.

Staff

Spring Qtr.

62.204 Psychology of Sport

(Prereq. Consent of instructor) 2 Q.H.

The psychological analysis of behavioral patterns and interactions in individual and team sports; includes personality and motivation, competition and sportsmanship, the role of spectators.

Staff

Spring Qtr.

62.206 First Aid

2 Q.H.*

First Aid procedures recommended for the home, school, and community. Emphasis on practices endorsed by the American Red Cross.

Staff

Spring Qtr.

62.208 Sociology of Sport and Dance

(Prereq. Consent of instructor) 2 Q.H.

The study of sport and dance as a social institution, including theories explaining the role of each in contemporary society, and the part of each in evolving societies.

Staff

Spring and Summer Qtrs.

62.210 History and Philosophy of Physical Education

An analysis of prominent philosophies of life, education, physical education, and the construction of one's personal philosophy. The influence of philosophical positions upon the nature of physical education programs is also analyzed.

62.212 Theory of Coaching

(Prereq. Consent of instructor) 2 Q.H.

An analysis of learning principles, sociology, and psychology as applied to the coaching of individual, dual, and team sports. Techniques and standards of squad recruitment, organization, leadership, and coaching ethics are presented.

Staff

Fall and Winter Qtrs.

*Including lab.

62.215 Observation of Student Behavior

2 Q.H.*

The growth and development of elementary children and adolescents in physical education through direct observations and laboratory work with children.

Staff

Spring Qtr.

62.217 Theory of Play

2 Q.H.

The nature of play and a study of cross-cultural patterns of play. An investigation of selected theories of play, including Huizinga, Caillois, Sutton-Smith, and Lee.

Staff

Fall and Winter Qtrs.

62.218 Elementary School Activities I

(Prereq. 50.121) 4 Q.H.*

The development of knowledge and skill beyond the advanced beginning level in the following activities for elementary school children: dance, gymnastics, movement education, low organization games, lead-up games, and aquatics. Analysis of elementary school children's performance and appropriate teaching techniques for the elementary school are observed and applied through observations and laboratory experience.

Staff

Spring and Summer Qtrs.

62.221 Perceptual-Motor Learning and Development

(Prereq. 50.121) 3 Q.H.

Interrelationships of movement behavior and perceptual-motor organizations of vision, audition, proprioception, and psycho-social effects of perception. A brief overview of major theories of learning as they apply to learning motor skills.

Staff

Fall and Winter Qtrs.

62.24A Coaching Competitive Swimming

(Prereq. 62.10B or consent of instructor) 2 Q.H.*

Instruction in the techniques, theory, and coaching methods of competitive swimming and diving.

Staff

Winter Qtr.

62.24B Swimming Analysis

(Prereq. 62.10B or consent of instructor) 2 Q.H.*

Instruction in theory, analysis techniques, and teaching methods in swimming.

Staff

Summer Qtr.

62.24C Smallcraft Analysis

(Prereq. 62.10Q) 2 Q.H.*

Instruction in techniques, theory, and teaching methods of small craft classes. Red Cross certification possible.

Staff

Summer Qtr.

62.24E Analysis and Coaching of Men's Gymnastics

(Prereq. 62.13T) 2 Q.H.*

Skill analysis and coaching of men's gymnastics, with emphasis on appropriate teaching methods, new trends, and judging.

Staff

Fall and Winter Qtrs.

62.24F Analysis and Coaching of Women's Gymnastics

(Prereq. 62.13S) 2 Q.H.*

Skill analysis and coaching of women's gymnastics, with emphasis on appropriate teaching methods and new trends.

Staff

Fall and Winter Qtrs.

62.24G Advanced Analysis and Judging of Women's Gymnastics

(Prereq. 62.13P or 62.13R) 2 Q.H.*

Advanced skill analysis techniques and instruction in judging women's gymnastics leading toward a judging certification.

Staff

Winter and Spring Qtrs.

62.24H Analysis and Coaching of Badminton

(Prereq. 62.14E) 2 Q.H.*

Analysis of performance and methods of teaching and coaching in badminton.

Staff

Spring and Summer Qtrs.

62.24J Analysis and Coaching of Tennis

(Prereq. 62.14G) 2 Q.H.*

Analysis of performance and methods of teaching and coaching in tennis.

Staff

Spring and Summer Qtrs.

*Including lab.

- 62.24K Analysis and Coaching of Fencing** (Prereq. 62.15N or 62.15P) 2 Q.H.*
Advanced skill analysis and coaching of fencing. Special emphasis on current research and teaching methods of fencing.
Staff Winter and Spring Qtrs.
- 62.24L Analysis and Coaching of Golf** (Prereq. 62.15G or equiv.) 2 Q.H.*
Advanced skill analysis and coaching of golf. Special emphasis on course play and teaching methods. *Lab. fee.*
Staff Fall, Spring, and Summer Qtrs.
- 62.24M Analysis and Coaching of Track and Field** (Prereq. 62.16M or equiv.) 2 Q.H.*
Advanced skill analysis and coaching of all track and field skills. Special emphasis placed on the analysis of common movement patterns, teaching methods, and coaching techniques for the individual performer.
Staff Spring and Summer Qtrs.
- 62.24N Analysis and Coaching of Wrestling** (Prereq. 62.15L or equiv.; men only) 2 Q.H.*
Analysis of performance and techniques of teaching selected wrestling skills are covered in detail. Application of research to methodology is stressed.
Staff Fall and Winter Qtrs.
- 62.24P Analysis and Coaching of Baseball** (Prereq. 62.18E) 2 Q.H.*
The basic techniques and responsibilities of coaching interscholastic and intercollegiate baseball; to include advanced skill analysis, position and team play, conditioning, practice organization, and team management.
Staff Fall, Spring, and Summer Qtrs.
- 62.24Q Analysis and Coaching of Basketball** (Prereq. 62.17C) 2 Q.H.*
The basic techniques and responsibilities of coaching interscholastic and intercollegiate basketball; to include advanced skill analysis, position and team play, conditioning, practice organization, and team management.
Staff Fall and Winter Qtrs.
- 62.24R Analysis and Coaching of Field Hockey** (Prereq. 62.17K; women only) 2 Q.H.*
The basic techniques and responsibilities of coaching intramural, interscholastic, and intercollegiate field hockey; to include advanced skill analysis, position, and team play, conditioning, practice organization, and team management.
Staff Fall and Spring Qtrs.
- 62.24S Analysis and Coaching of Football** (Prereq. 62.17Q; men only) 2 Q.H.*
The basic techniques and responsibilities of coaching interscholastic and intercollegiate football; to include advanced skill analysis, team conditioning, offensive and defensive systems, practice organization, team management, and coaching staff organization.
Staff Fall and Spring Qtrs.
- 62.24U Analysis and Coaching of Ice Hockey** (Prereq. 62.17G; men only) 2 Q.H.*
The basic techniques and responsibilities of coaching interscholastic and intercollegiate ice hockey; to include advanced skill analysis, position and team play, conditioning, practice organization, and team management.
Staff Winter Qtr.
- 62.24V Analysis and Coaching of Lacrosse** (Prereq. 62.18A or 62.18K) 2 Q.H.*
The basic techniques and responsibilities of coaching intramural, interscholastic, and intercollegiate lacrosse; to include advanced skill analysis, position and team play, conditioning, practice organization, and team management.
Staff Spring and Summer Qtrs.
- 62.24W Analysis and Coaching of Soccer** (Prereq. 62.18N or 62.18R) 2 Q.H.*
The basic techniques and responsibilities of coaching intramural, interscholastic, and intercollegiate soccer; to include advanced skill analysis, position and team play, conditioning, practice organization, and team management.
Staff Spring and Summer Qtrs.

62.24X Analysis and Coaching of Softball

(Prereq. 62.18D; women only) 2 Q.H.*

The basic techniques and responsibilities of coaching intramural, interscholastic, and intercollegiate softball; to include advanced skill analysis, and management.

Staff

Spring and Summer Qtrs.

62.24Y Analysis and Coaching of Volleyball

(Prereq. 62.17J) 2 Q.H.*

The basic techniques and responsibilities of coaching intramural, interscholastic, and intercollegiate volleyball; to include advanced skill analysis, position and team play, conditioning, practice organization, and team management.

Staff

Fall and Winter Qtrs.

62.249 Physical Science Foundations

3 Q.H.*

A treatment of basic concepts and fundamentals of chemistry and physics as applied to human physiology and movement.

Staff

Spring Qtr.

62.250 Anatomy and Physiology I

4 Q.H.*

Gross anatomy and physiology of the human skeletal, joint, and muscular systems.

Staff

Fall and Winter Qtrs.

62.251 Anatomy and Physiology II

(Prereq. 62.250 or consent of instructor) 4 Q.H.*

Gross anatomy and physiology of the human nervous and circulatory systems.

Staff

Spring and Summer Qtrs.

62.252 Anatomy and Physiology III

(Prereq. 62.251 or consent of instructor) 4 Q.H.*

Gross anatomy and physiology of the human endocrine, respiratory, digestive, and urinary systems.

Staff

Fall and Winter Qtrs.

62.253 Kinesiology

(Prereq. 62.250 or equiv.) 4 Q.H.*

Science of human motion and anatomic and mechanical principles as they relate to an understanding of skillful, efficient, and purposeful human motion. Introduction to cinematographic analysis.

Staff

Fall, Winter, and Spring Qtrs.

62.254 Exercise Physiology

(Prereq. 62.253) 4 Q.H.*

Study of the immediate and long-range effects of exercise upon the human body, with emphasis on muscles, circulation, respiration, and metabolism; the scientific foundations of physical fitness; survey of related research.

Staff

Fall, Winter, and Summer Qtrs.

62.255 Adapted Physical Education

(Prereq. 62.252 or equiv.) 4 Q.H.*

Study of disabilities which prevent participation in unrestricted physical education programs. Selection and modification of physical activities to meet individual needs.

Staff

Fall, Winter, and Summer Qtrs.

62.256 Athletic Training and Conditioning

3 Q.H.*

The training and conditioning procedures in athletic programs; special emphasis on the prevention of athletic injuries; role of the trainer, athlete, coach, and health service.

Staff

Fall, Winter, and Summer Qtrs.

62.257 Advanced Athletic Training

(Prereq. 62.256) 4 Q.H.*

The advanced preparation and utilization of programs of conditioning and administration for prevention and care of injuries associated with competitive athletics.

Staff

Fall and Winter Qtrs.

62.260 Measurement and Evaluation

4 Q.H.

Construction, use, selection, and interpretation of evaluative tools applicable to physical education; elementary statistical methods.

Staff

Fall and Winter Qtrs.

*Including lab.

62.270 Administration of Physical Education

(Prereq. 62.210) 4 Q.H.

The organization and administration of programs in physical education, with emphasis on the elementary and secondary school program.

Staff

Spring Qtr.

62.273 Sports Officiating

(Prereq. Women only) 2 Q.H.*

Theory, practice, and techniques of officiating. Choice of: basketball, volleyball, softball, soccer, field hockey, lacrosse.

Staff

All Qtrs.

62.274 Sports Officiating

(Prereq. Women only) 2 Q.H.

Theory, practice, and techniques of officiating. Choice of: basketball, volleyball, softball, soccer, field hockey, lacrosse.

Staff

All Qtrs.

62.275 Critical Teaching Skills

3 Q.H.

Experience using the taxonomies of educational objectives to write, conduct, and evaluate educational and behavioral objectives. Analysis of direct and indirect, verbal and nonverbal teaching behavior for classroom and activity teaching to be studied by micro-teaching, simulation, and interaction analysis techniques.

Staff

Fall and Winter Qtrs.

62.277 Outdoor Teaching Lab

2 Q.H.

A three-week resident summer practicum at the Warren Center. Provides opportunities for assumption of counseling, teaching, and leadership roles in special camp programs, land sports, nature, pioneering, arts and crafts, and aquatics. Youngsters of various ages from the Boston area are assigned in residence as subject campers.

Staff

Summer Qtr.

62.279 College Teaching Experience (Pass/Fail)

(Prereq. Seniors with consent of instructor) 1 Q.H.*

Experience in teaching physical education at the college level. Achieved by assisting and teaching in University classes supervised by a member of the college faculty.

Staff

All Qtrs.

62.280 Curriculum Development

(Prereq. 62.275 or consent of instructor) 3 Q.H.

Basic foundations of curriculum development stressing fundamental principles and guides to curriculum organization, format, and evaluation. Survey of existing curricula and the development of an understanding of current curriculum trends.

Staff

Spring Qtr.

62.282 Supervised Student Teaching

12 Q.H.

Assignment to public school(s) for observation and practice teaching under the guidance of a cooperating teacher and a college supervisor. Association with the main duties assumed by physical education teachers, including coaching and/or intramural organization and supervision. Individual conferences and seminars.

Staff

Fall and Winter Qtrs.

62.283 Modern Dance Composition

(Prereq. 62.12F or consent of instructor) 3 Q.H.*

An analysis of dance composition, with practice in choreography for solo, duet, and trio.

Staff

Spring Qtr.

62.284 Dance History and Philosophy

4 Q.H.

A survey of dance from ancient times to the present. Consideration of dance as an art form in relation to other art forms and of dance as an educational discipline.

Staff

Spring Qtr.

62.286 Dance: Choreography and Production

4 Q.H.*

Choreography for trio, quartet, and large groups based upon the projection of an idea or mood. Theory and practice in the staging of student choreography, including lighting, costuming, scenery, and makeup.

Staff

Winter Qtr.

*Including lab.

62.288 Recreational Dance

(Prereq. 62.12B or equiv.) 2 Q.H.*

Theory and practice of the methods and materials in the teaching of recreational dance forms at the primary and secondary levels.

Staff

Spring Qtr.

62.289 Creative Dance I

(Prereq. 62.12F or equiv.) 2 Q.H.*

Theory and practice of methods and materials in the teaching of creative dance to elementary school children. Examination of the aims and responsibilities of dance education at the primary level.

Staff

All Qtrs.

62.290 Creative Dance II

(Prereq. 62.12F or equiv.) 2 Q.H.*

Theory and practice of methods and materials in the teaching of creative dance to secondary school children. Examination of the aims and responsibilities of dance education at the secondary level.

Staff

All Qtrs.

62.291, 62.292, 62.293 Special Problems

(Prereq. Consent of Dept. chairman) 2, 3, or 4 Q.H.

Independent investigation of physical education in an area of each student's interests. The investigation will be supervised by an appointed faculty member and will culminate in a formal written report.

Staff

All Qtrs.

Recreation Education

63.120 Orientation to Recreation

1 Q.H.

A general orientation to the entire field of recreation and its role in society. Exposure to background, goals, philosophy, leadership, and programs in various settings. Orientation to the curriculum, the three-track system, and career opportunities.

Prof. Eliopoulos

Fall Qtr.

63.12A Social Recreation I

1 Q.H.

Aimed at developing skill in selecting appropriate social recreational activities and employing effective methods of organizing and teaching these activities to groups. Content areas to be explored include active and passive games, mixers, paper and pencil and table games.

Prof. Eliopoulos

Fall and Winter Qtrs.

63.12B Social Recreation II

1 Q.H.

Aimed at developing skill in organizing various social recreational activities into meaningful and effective social recreation programs. Population to be considered: children, youth, young adults, senior citizens, and residents in nursing homes.

Prof. Eliopoulos

Spring Qtr.

63.12C Basic Folk Dance

1 Q.H.

Basic national and international folk dances appropriate for use with a wide range of age groups. Development of appreciations and understandings of the values and program potential of folk dance to receive primary consideration. General techniques of teaching to be included.

Prof. Cipriano

Fall Qtr.

63.12D Dramatic Games

1 Q.H.

Dramatic games and activities suitable for use in recreational programs at camps, playgrounds, hospitals, nursing homes; community and agency settings. Basic nature of this course will be participation and creative demonstrations of these activities.

Prof. Eliopoulos

Fall, Winter, and Spring Qtrs.

*Including lab.

63.12E Paper Crafts

1 Q.H.

The use of paper to create "illusions." The primary study area will include oragami, paper design, veiling and folding; sketching with pencil, charcoal and pastels. The study of perspective; and the use of water colors and acrylics in painting.

Ms. Dawson

Fall, Winter, and Spring Qtrs.

63.12F Sculpture

1 Q.H.

An introduction to various simple forms of sculpture including papier maché, soap, stone, wire, clay and wood.

Ms. Dawson

Fall, Winter, and Spring Qtrs.

63.12G Textiles

1 Q.H.

An introduction to textile printing, weaving and macramé. Study areas will include block printing, silk screen printing, tie dyeing, batik, string designs, macramé and simple hand-loom weaving.

Ms. Dawson

Fall, Winter, and Spring Qtrs.

63.12H Inexpensive Crafts

1 Q.H.

Employs the use of collected scrap materials in arts and crafts programs.

Ms. Dawson

Fall and Winter Qtrs.

63.12I Guitar I

1 Q.H.

An introduction to the use of guitar in recreation programs. Skill development will include basic chords, progressions, and strumming techniques.

Ms. Dawson

Fall, Winter, and Spring Qtrs.

63.12J Guitar II

(Prereq. 63.12I) 1 Q.H.

Concentration will include basic picking techniques, the use of base notes to enhance music, additional progressions and chords.

Prof. Eliopoulos

Spring Qtr.

63.12K Square Dance

1 Q.H.

The development of the following skills: performance, teaching and calling. The course content will cover beginner through advanced square and contra dances. Understandings related to historical development and values to be included.

Prof. Cipriano

Fall and Winter Qtrs.

63.12L International Folk Dance I

1 Q.H.

Folk dances of Northern Europe, Scandinavia, and Mediterranean countries. The course emphases are on developing performance skills, teaching skills and appreciation.

Prof. Cipriano

Fall and Winter Qtrs.

63.12M International Folk Dance II

1 Q.H.

Folk dances of the British Isles, Central Europe, and South American countries. The course emphases are on developing performance skills, teaching skills and appreciations.

Prof. Cipriano

Fall, Winter, and Spring Qtrs.

63.12N International Folk Dance III

(Prereq. 63.12M) 1 Q.H.

Folk dances of Slavic, Baltic and Southern European countries. The course emphases are on developing performance skills, teaching skills and appreciations.

Prof. Cipriano

Spring Qtr.

63.12P Sports Leadership

2 Q.H.

The exploration of teaching techniques involving team, dual and individual sports. Methods, such as the part-whole, or whole-part will be presented and investigated to establish relevance to each of the sport areas under study. Students will develop skill in planning units and individual lessons. In addition students will apply theory and practical experience by teaching one lesson in each of the sports areas studied.

Prof. Eliopoulos

Spring and Summer Qtrs.

63.12Q Survey of Aquatics

(Prereq. Demonstrated swimming proficiency) 2 Q.H.

Exploration of various aquatic events that can enhance recreational swimming programs. Students will develop planning, execution and evaluation techniques for each area of study.

In addition students will attend and evaluate a planned water event. Areas of study will include party events for all ages, competitive swimming and diving, synchronized swimming, water polo, events for the atypical.

Ms. Dawson

Spring and Summer Qtrs.

63.12R Rhythm Bands

1 Q.H.

The rhythmic aspect of music is perhaps the most stimulating and without question, the simplest part of all the ingredients in music to understand. Percussive instruments such as cymbals, drums of many sizes, xylophones, triangles and other rhythmic instruments help create many interesting patterns of sound and are studied in their relationship to rhythm.

To be announced

Fall and Winter Qtrs.

63.12S Handcrafted Games

1 Q.H.

A practical laboratory experience in constructing recreational games with a variety of inexpensive media and re-cycled materials: paper, cardboard, styro-foam, boxes, plastics, wood, nuts, bolts, etc. The techniques of mitering, soldering and drilling will be emphasized in the construction of the games. Adaptations and special devices to accommodate persons with a wide variety of disabilities will be considered in the course content.

Prof. Eliopoulos

Fall and Winter Qtrs.

63.12T Photography

1 Q.H.

The history of photography, types of cameras, use of black and white and color films, use of F-stops and shutter speeds, dark room equipment, supplies and procedures. Field trips utilizing photography techniques and dark room experience will complete the course.

Prof. Sayed

Fall, Winter, and Spring Qtrs.

63.12U Cultures

1 Q.H.

The study of cultures throughout the world. Students will investigate various countries in terms of history, climate, topography, occupations, customs music, instruments, festivals and holidays; folklore and folk art.

Prof. Robinson

Fall, Winter, and Spring Qtrs.

63.12V Introduction to Organized Camping

1 Q.H.

Course basis will lead up to the practical experience (63.124) at the Warren Center. Includes history of camping, types of camps, camp seasons and sessions, variety in programs and emphases, common features, objectives contributions and limitations of camping, American Camping Association, current trends, and study of children in groups.

Ms. Dawson

Spring Qtr.

63.121 Recreation Skills I

3 Q.H.*

Skill development, participation, and leadership in the following selected recreational activities: social recreation, volleyball, and badminton and music (introduction to guitar).

Prof. Haché and Ms. Dawson

Fall Qtr.

63.122 Recreation Skills II

4 Q.H.*

Skill development, appreciation, participation, and leadership in tumbling and gymnastics, folk dance, music (introduction to guitar), and basic Red Cross swimming.

Prof. Haché and Ms. Dawson

Winter Qtr.

63.123 Recreation Skills III

4 Q.H.*

Development of leadership skill in social recreation activities: music, folk dance, games, and party program planning, including leadership experience with groups. Counselor education, philosophy, and leadership methods in camping. Red Cross life-saving course.

Prof. Haché and Ms. Dawson

Spring Qtr.

63.124 Camp Leadership

2 Q.H.

One-week resident camp experience at the Warren Center. Course includes natural sciences, Red Cross basic sailing and canoeing, camp-craft skills, outdoor sports and leadership techniques for special camp programs. Fee charged for room and board.

Ms. Dawson

Summer Qtr.

*Including lab.

- 63.125 Outdoor Education and Camp Leadership** 4 Q.H.
A two-week resident summer session at Warren Center: includes natural science, aquatics, overnight camping, Indian lore, ACA campcraft certification, leadership in special camp programs, outdoor sports, and small craft training.
Prof. Eliopoulos and Staff Summer Qtr.
- 63.126 Outdoor Education I** 3 Q.H.*
Interpretation of natural science and ecology. Emphasis on the development of personal skills through laboratory, field trips, lectures, and learning experiences in the out-of-doors.
Prof. Jeffrey and Staff Fall and Winter Qtrs.
- 63.127 Outdoor Education II** 3 Q.H.*
Emphasis in developing understanding, interest, and field biology skills for ecology, conservation, and recreation.
Ms. Dawson Spring and Summer Qtrs.
- 63.128 Survey of Outdoor Recreation and Park Facilities** 3 Q.H.
Fundamental management and administration concepts for a wide variety of outdoor areas and facilities such as parks, beaches, ice rinks, marinas, and camps.
Ms. Dawson Winter and Spring Qtrs.
- 63.129 School Camping** 3 Q.H.
Administration and leadership in school outdoor education and conservation programs in the natural environment. Field trips and laboratory include experience with school-age groups.
Prof. Cipriano Spring Qtr.
- 63.140 Sailing** (Prereq. 63.124 and basic sailing) 2 Q.H.
One week of intensive instruction leading to Red Cross Instructors and Standard First Aid Certification (students must successfully pass written and practical exam to be certified). Participants will be in residence at the Warren Center for the duration of the course. Fee charged for room board and books.
Ms. Dawson Summer Qtr.
- 63.141 Canoeing** (Prereq. 63.124 and basic canoeing) 2 Q.H.
One week of intensive instruction leading to Red Cross Instructors and Standard First Aid Certification (students must successfully pass written and practical exams to be certified). Canoe tripping may be included in this program. Participants will be in residence at the Warren Center. Fee charged for room, board, and books.
Ms. Dawson Summer Qtr.
- 63.142 Water Safety Instructor** (Prereq. 63.124 and life saving) 2 Q.H.
One week of intensive skill development and teaching techniques leading to Red Cross Instructors and Standard First Aid Certification (students must successfully pass written and practical exams to be certified). Pool and lake training will be utilized. Participants will be in residence at the Warren Center. Fee charged for room, board, and books.
Ms. Dawson Summer Qtr.
- 63.144 Tripping and Orienteering** (Prereq. 63.124) 2 Q.H.
One week intensive practical experience in the art of orienteering and its uses in trip camping, backpacking and overnight camping. Red Cross Standard First Aid and ACA Campcraft Certification will be included as part of this course (students must successfully pass written and practical exams to be certified). Participants will be in residence at Warren Center. Fee charged for room, board and books.
Ms. Dawson Summer Qtr.
- 63.145 Winter Sports** 2 Q.H.
Five-day resident session. Instruction in alpine skiing, ski-touring, and snow-shoeing. Environmental observations and lectures. Fee charged for room and board. Equipment rental as needed.
Prof. Eliopoulos Winter Qtr.

63.146 Camp Administration

3 Q.H.

Major problems involved in the establishment and operation of organized camps, including school, summer, and day camps. Selection of camp sites: sanitation, program, schedule, training personnel, finances, good management, and promotion.

Prof. Jeffrey

Fall and Winter Qtrs.

63.147 Outdoor Education for the Handicapped

3 Q.H.

Program planning, methods of conducting programs relating to adaptation of facilities and activities necessary for the physically and mentally disabled, including observations, participation and direct laboratory experience.

Profs. Robinson and Sayed

Summer Qtr.

63.150 Anatomy and Physiology I

3 Q.H.*

Gross anatomy and physiology of the human skeletal, articular, muscular, and nervous systems. Implications for recreation programs.

Prof. Sayed

Fall and Winter Qtrs.

63.151 Anatomy and Physiology II

3 Q.H.*

Gross anatomy and physiology of the human endocrine, circulatory, respiratory, digestive, and urinary systems. Implications for recreation programs.

Prof. Sayed

Spring and Summer Qtrs.

63.152 Analysis of Movement as Applied to Recreation

4 Q.H.

The identification of muscles and muscle groups that may be involved in therapeutic recreation activities, which will enable the student to select the most suitable activity for a given disability. Includes analysis of movement and a review of muscle attachment and action.

Prof. Sayed

Spring and Summer Qtrs.

63.153 Social and Psychological Impacts of Disabilities

4 Q.H.

An interdisciplinary approach to social and psychological understanding of the impact of disabilities and handicaps, enabling the recreation therapist to evaluate and understand behavioral changes in the handicapped population.

Prof. Sayed

Fall and Winter Qtrs.

63.160 Technological Resources

3 Q.H.

A study of practical use by recreation professionals of audiovisual, instructional, and computer technology.

Prof. Morrison

Spring and Summer Qtrs.

63.210 Philosophy of Recreation

3 Q.H.

A study of history, theories, concepts, attitudes of play, recreation, and leisure related to developing a personal philosophy. Viewpoints and input from other fields as they apply to recreation and leisure.

Prof. Robinson

Fall and Winter Qtrs.

63.215 Trends and Issues in Recreation

3 Q.H.

For nonmajors in Recreation. National and international issues and trends in the professional field; trends in participation with professional implications; emerging programs; legislation; the leader and the future.

Prof. McCay

Spring Qtr.

63.220 Methods and Materials in Recreation

3 Q.H.

Program planning in recreation includes the study of the physical, social, and emotional characteristics and needs of all age groups, and the most appropriate recreational programs that meet the needs of these individuals and groups. Also includes programs for special occasions and evaluation of programs for improvement purposes. The role of leadership in developing and operating programs is discussed.

Prof. Cipriano

Fall and Winter Qtrs.

*Including lab.

63.249 Process of Aging

3 Q.H.

The study of phases of aging. Discussing the physical, social and emotional changes or problems which face the aged. The study of types of services offered to senior citizens; sources of funds allocated to sponsor such services. The role of recreation will be emphasized.

Prof. Sayed

Fall and Winter Qtrs.

63.250 Group Dynamics

3 Q.H.

Designed for promoting an understanding of group processes and developing human relations skills. Major areas of concentration include: communications, leadership, decision making, and evaluation of the group process.

Prof. Eliopoulos

Fall and Winter Qtrs.

63.255 Introduction to Therapeutic Recreation

3 Q.H.

Philosophy and concepts of the scope of recreation therapy in the process of rehabilitating disabled and handicapped people. An orientation to disabilities and their impact on the individual, family and society. Includes medical terminology and field visitations.

Profs. Robinson and Sayed

Fall and Winter Qtrs.

63.256 Recreation Activities for Special Populations

3 Q.H.

Basic principles of programming for special populations. Adaptation of recreation activities to meet the needs of handicapped individuals in a variety of settings.

Profs. Eliopoulos and Cipriano

Fall and Winter Qtrs.

63.257 Workshop in Therapeutic Recreation

3 Q.H.

A practical application in designing and implementing a series of innovative recreation programs for special populations.

Profs. Eliopoulos and Cipriano

Spring Qtr.

63.260 Administration of Recreation and Parks

4 Q.H.

Administration procedures of tax-supported recreation and park operations. Concentration on legality, commissions, area and facility design. Also personnel policies and problem solving related to administration and management.

Prof. Robinson

Fall and Winter Qtrs.

63.262 Budgeting Systems in Recreation

3 Q.H.

A study of planning-programming-budgeting systems (PPBS); applications in recreation. Clearly stated agency objectives and multi-year planning will be linked to systematic budget decisions. The course will be applicable to all areas of recreation. Topics of special interest to the class (e.g., bidding procedures) will also be discussed.

Prof. Morrison

Fall and Winter Qtrs.

63.266 Recreation and Community Schools

3 Q.H.

The place of the school in community recreation. Special emphasis on the schools' 12-month program to meet the needs of all ages. Field programs dealing with the community school concept.

Prof. Sayed

Spring Qtr.

63.267 Introduction to Youth Groups

3 Q.H.

Philosophy, history, and programs of such various youth groups as YMCA's, YWCA's, and Boys' and Girls' Clubs. Visiting and evaluating programs of selected clubs and organizations. Identification of service agencies in the United States and comparative study of youth programs in different countries.

Prof. Cipriano

Spring and Summer Qtrs.

63.280 Supervised Field Experience and Teaching

16 Q.H.

Comparable to student teaching in education. Professional assignment in recreation setting; i.e., industry, center, school, hospital, agency, organization, housing, settlement, park playground, camp. Supervision and conferences; seminar.

Prof. McCay

All Qtrs.

63.285 Introduction to Research

4 Q.H.

A study of empirical research procedures, including: planning the study, sampling, designing

instrumentation, gathering and analyzing data. Students write a research proposal, simulate response data, and analyze such data through use of computer-based statistical packages.
Prof. Morrison Fall and Winter Qtrs.

63.290 Research Seminar

(Prereq. 63.285) 4 Q.H.*

Students design and carry out individual or collaborative research projects under close faculty supervision. Each student is encouraged to use the proposal developed in 63.285 (Introduction to Research) as a basis for such a project. A written report of research findings is required.

Prof. Morrison

Spring Qtr.

Physical Therapy

64.114 Introduction to Physical Therapy

2 Q.H.*

Orientation to the field of physical therapy and its role in the health professions; theory and practice in applied body mechanics and basic procedures related to patient management.
Miss Foster, Mrs. Leventhal and Staff Winter Qtr.

64.115 Introduction to Physical Therapy

(Prereq. 64.114) 2 Q.H.*

Practice in the preparation of patients and equipment for various treatment procedures. Introduction to ambulation and safety procedures. Theory demonstration and practice in heat, light hydrotherapy.
Miss Sloop and Staff Spring and Summer Qtrs.

64.123 Gross Anatomy

(Prereq. 18.126, 18.148, 64.115) 6 Q.H.*

The structure and functions of the human body with particular emphasis on the skeletal, muscular and nervous systems. Lecture and laboratory with dissection.
Prof. Powers and Staff Fall and Winter Qtrs.

64.126 Physiology for Physical Therapists

(Prereq. 18.126, 18.148) 2 Q.H.*

Neuromuscular, cardiovascular and respiratory physiology, and physiology of heat and cold related to physical therapy.
Mr. Hardy and Staff Fall and Winter Qtrs.

64.130 Applied Anatomy

(Prereq. 64.123, 64.126, 64.141) 4 Q.H.*

A further study of neuromuscular function with emphasis on the mechanical and physiological factors involved; application to normal and pathological movements.
Miss MacFarlane and Staff Spring and Summer Qtrs.

64.141 Physical Therapy I

(Prereq. 11.172, 18.126, 18.148, 64.115) 2 Q.H.*

Theory, demonstration and practice in massage.
Mr. Hardy and Mrs. Leventhal Fall and Winter Qtrs.

64.142 Physical Therapy II

(Prereq. 64.123, 64.126, 64.141, 62.221) 3 Q.H.*

Theory, demonstration and practice in evaluation procedures.
Miss Cardinali, Mrs. Filler, and Staff Spring and Summer Qtrs.

64.143 Physical Therapy III

(Prereq. 64.123, 64.126, 64.141, 62.221) 4 Q.H.*

Theory, demonstration and practice in basic therapeutic exercise.
Miss Cardinali, Mrs. Filler, and Staff Spring and Summer Qtrs.

64.144 Physical Therapy I

(Prereq. 11.172, 18.126, 18.148, 64.115) 4 Q.H.*

This course is replaced by 64.141.
Miss Foster, Mrs. Leventhal, and Staff Fall and Winter Qtrs.

64.145 Physical Therapy II

(Prereq. 64.121, 64.131, 64.144) 4 Q.H.*

This course is replaced by 64.142.
Prof. Cerasoli, Miss Cardinali, Mrs. Leventhal, and Mrs. Williams Spring and Summer Qtrs.

*Including lab.

64.146 Physical Therapy III

(Prereq. 64.121, 64.131, 64.144) 4 Q.H.*

This course is replaced by 64.143.

Prof. Van Slyck, Miss Cardinali, and Staff

Spring and Summer Qtrs.

64.156 Physical Therapy IV

(Prereq. 64.130, 64.142, 64.143) 3 Q.H.*

Theory, demonstration and practice in prosthetics and orthotics; analysis of functional activities.

Prof. Cerasoli, Miss Cardinali, Miss Foster, and Mr. Hardy

Fall and Winter Qtrs.

64.158 Physical Therapy V

(Prereq. 64.130, 64.142, 64.143) 4 Q.H.*

Theory, demonstration and practice in advanced therapeutic exercise.

Prof. Cerasoli, Miss Cardinali, and Staff

Fall and Winter Qtrs.

64.159 Clinical Seminar

(Prereq. 64.146, 64.158, 64.171, 64.250) 3 Q.H.

Selected topics related to clinical aspects in physical therapy. Interpersonal relationships, ethics and teaching methods.

Profs. Shaffer and Cerasoli

Spring and Summer Qtrs.

64.165 Research Process I

(Prereq. 64.159, 64.172, 64.178, 64.227, 64.228) 2 Q.H.*

Professional literature through journal club; introduction to scientific methodology and preparation of an independent research proposal.

Prof. Cerasoli and Staff

Fall and Winter Qtrs.

64.171 Physical Therapy VI

(Prereq. 64.130, 64.142, 64.143) 2 Q.H.*

Physical therapy management of medical and surgical chest disorders.

Prof. Cerasoli, Mrs. Filler, and Staff

Fall and Winter Qtrs.

64.172 Physical Therapy VII

(Prereq. 64.156, 64.158, 64.171) 3 Q.H.*

Theory, demonstration and practice in electromyography, electrical testing and treatment procedures.

Miss Sloop and Staff

Spring and Summer Qtrs.

64.173 Rehabilitation

(Prereq. 64.159, 64.172, 64.178) 2 Q.H.

Concepts of rehabilitation and community health presented by Allied Health personnel. Emphasis on the role of the physical therapist as a member of the health team. Class discussion and seminar.

Mrs. Leventhal

Fall and Winter Qtrs.

64.176 Administration

(Prereq. 64.165, 64.173, 64.186) 3 Q.H.

Principles and methods in administrative responsibilities including supervision and consultation.

Mrs. Leventhal and Miss Sloop

Spring Qtr.

64.178 Physical Therapy VIII

(Prereq. 64.156, 64.158, 64.171) 2 Q.H.*

Analysis of evaluation procedures appropriate for specific cases and planning therapeutic exercise programs, integrating all methods of treatment.

Prof. Van Slyck, Miss Cardinali, and Mrs. Filler

Spring and Summer Qtrs.

64.182 Psychosocial Aspects of Illness

(Prereq. 64.165, 64.173, 64.186) 2 Q.H.

Interpersonal relationships between patient, family, therapist and society with reference to the impact and reactions to illness.

Mrs. Leventhal and Staff

Spring Qtr.

64.210 Pathology

(Prereq. 11.172, 18.126, 18.148, 64.115) 3 Q.H.

Lectures and demonstrations of pathological and gross specimens. Inflammation, repair, infection, immunity and hypersensitivity, degenerative processes, disturbances of metabolism and circulation; disorders of growth, including tumors.

Gherardo J. Gherardi, M.D.

Fall Qtr.

64.220 Clinical Medicine I

(Prereq. 11.172, 18.126, 18.148, 64.115) 2 Q.H.

Pediatric and orthopedic conditions.

John W. Graef, M.D., Henry H. Banks, M.D. and Associates

Fall and Winter Qtrs.

64.227 Clinical Medicine II

(Prereq. 64.123, 64.126, 64.141) 3 Q.H.

Lectures covering various areas of medicine and neurology related to conditions commonly encountered in patients treated by physical therapists.

Sidney Koretsky, M.D., John F. Sullivan, M.D. and Associates

Spring Qtr.

64.228 Clinical Medicine III

(Prereq. 64.123, 64.126, 64.141) 3 Q.H.

Surgical procedures and clinical pathology.

Henry H. Banks, M.D. and Associates, Carl V. Granger, M.D. and Associates

Spring Qtr.

64.234 Clinical Psychiatry

(Prereq. 18.126, 18.148, 19.102, 19.140) 2 Q.H.

Review of psychiatric categories including consideration of etiology and treatment. Psychosocial variables significant in the management of patients with whom the physical therapist is concerned.

Fred Hinman, M.D.

Winter Qtr.

64.238 Research Process II

(Prereq. 64.165, 64.173, 64.186) 3 Q.H.*

Implementation of independent research proposals.

Prof. Cerasoli and Staff

Spring Qtr.

64.250 Neuroanatomy

(Prereq. 64.130, 64.142, 64.143) 3 Q.H.*

Morphological and functional management of the nervous system; derangement of normal structure and function of the nervous system in various diseases. Lecture and laboratory with dissection.

Prof. Powers and Staff

Fall and Winter Qtrs.

School and Community Health Education

65.110 Foundations of Health Education

2 Q.H.

Orientation to school health education: introduction to the conceptual approach in health education, with emphasis on personal health and factors influencing health. Introduction to the philosophy of health education.

Staff

Fall Qtr.

65.114 Mental Health

(Prereq. 19.102 or equiv.) 4 Q.H.

An investigation of mental illness and well-being as they relate to total health, with concern for the factors that influence mental and emotional behavior. Various approaches to mental health education in school programs included.

Miss Zaremba

Fall and Spring Qtrs.

65.116 Nutrition

(Prereq. 12.102) 4 Q.H.

The principles of good selection, including knowledge of the basic nutrients, with emphasis on building and maintaining sound health. Nutritional problems, such as deficiency diseases, food fallacies and fads, and weight control, including various approaches to nutrition education in school programs.

Staff

Fall and Spring Qtrs.

65.118 Drug Use and Abuse

4 Q.H.

The use and abuse of modern drugs in our society, including prescription and nonprescription drugs, alcohol and tobacco, and their physiological and psychological effects on the body; the social problems surrounding drug abuse, including various approaches to drug education in school programs. (Open to all N.U. students.)

Miss Maguire

Fall and Winter Qtrs.

65.129 Health Education

3 Q.H.

Principles of personal health; emphasis on information pertinent to mental and physical well-being, current social behavior, and effective approaches to college living.

Staff

Fall and Spring Qtrs.

*Including lab.

65.130 Health Problems of the College Student

(Prereq. Physical Education majors only) 3 Q.H.

Discussion of the major health problems affecting college students. Principles of personal health, with emphasis on healthful college living.

Staff

Spring Qtr.

65.140 Concepts in Health, Aging, and Longevity

4 Q.H.

Principles of the aging process and implications for diverse community, state, and national health programs.

Staff

Fall Qtr.

65.160 Instructional Resources

2 Q.H.

Survey of audio-visual media. Actual operation of selected types of equipment. Production of transparencies, felt boards, etc. Creative approaches stressed.

Staff

Winter Qtr.

65.207 First Aid, Safety, and Preventive Health Education

(Prereq. 65.110) 4 Q.H.

Focus on standard first aid, personal safety practices, and consumer health issues with emphasis on the development of prevention-conscious habits and attitudes.

Winter and Spring Qtrs.

65.215 School and Community Health

(Prereq. 65.129) 3 Q.H.

Focus on the teacher's all-important role in developing and relating the principles, patterns, and programs of school and community health education.

Staff

Summer Qtr.

65.216 Methods and Materials in Health Education

(Prereq. 65.129) 4 Q.H.

Materials appropriate to the teaching of health and safety in the elementary and secondary school; emphasis on direct unit instruction.

Staff

Winter Qtr.

65.217 Teaching Procedures/Curriculum in Health Education in School and Community

(Prereq. 19.146 or equiv.) 4 Q.H.

Current methods, with study of new approaches to instruction in health education. Includes analysis of curriculum and the relationships among curricula and teaching methods.

Staff

Spring Qtr.

65.218 Public Health

3 Q.H.

Principles of public health, with particular emphasis on the emerging patterns of community organization and activities in the public health field.

Staff

Fall and Winter Qtrs.

65.219 Public Health and Community Resources

4 Q.H.

Principles of community health, with emphasis on emerging contemporary local, national, and world health problems; health services, including the choice of medical care; consumer health; and available community resources for enriching school health programs. Focus on public and community service through health education.

Staff

Spring Qtr.

65.222 Drug Use and Abuse

(Prereq. 65.114, majors only) 4 Q.H.

Investigation of the use and abuse of modern drugs in our society, covering prescription and nonprescription drugs, alcohol and tobacco, and their physiological and psychological effects on the body. The social problems surrounding drug abuse are discussed, as are various approaches to drug education in school programs.

Miss Maguire

Spring Qtr.

65.223 Human Sexuality and the Family

(Prereq. 50.131) 4 Q.H.

Physical, psychological, social, historical, semantic, and comparative cultural aspects of human sexuality; needs and problems at several stages of maturation, including various approaches to sex education in the school.

Staff

Fall Qtr.

65.225 Communicable and Degenerative Diseases

(Prereq. 18.120) 4 Q.H.

The disease immunity process, with emphasis on prevalent communicable diseases in the

United States today and their transmission; chronic diseases; cardiovascular diseases; cancer, diabetes, and other constitutional and degenerative diseases and disorders which affect the nation's health.

Staff

Spring Qtr.

65.233 Organization and Administration of School and Community Health Education

4 Q.H.

Principles and methods of organization and administration of school health and community health education programs: ethics, personnel, budget, facility management, priorities.

Staff

Spring Qtr.

65.234 Health Problems of the School Child

4 Q.H.

Recognition of common physical, mental, and emotional health problems of children and youth, so that they may be dealt with intelligently by the classroom teacher.

Miss Maguire

Winter and Spring Qtrs.

65.235 Health Counseling

4 Q.H.

The identification of physical, mental, emotional, and social health problems; remedial procedures; and counseling techniques, so that problems may be dealt with intelligently by health educators.

Staff

Spring Qtr.

65.238, 65.239 Seminar

(Prereq. for 65.238 is 50.141) 2 Q.H.

(Prereq. for 65.239 is 65.238) 2 Q.H.

Discussion of current problems and new developments as they relate to health education in school and a variety of community settings. An introduction to research culminating in the writing of a research paper.

Staff

Spring Qtr.

65.240 Student Teaching/Field Experience

(Prereq. 65.217) 12 Q.H.

Observation and practical teaching experience in school health programs and/or field experience in selected community health education settings. Supervision and evaluation by personnel in cooperating schools and agencies and by Boston-Bouvé College faculty; seminars.

Staff

Fall Qtr.

Pharmacy

71.201 Pharmacy Orientation

1 Q.H.

A survey course designed to introduce the beginning Pharmacy student to the simple fundamentals of using the basic tools and equipment in the practice of pharmacy. Modern audiovisual aids explain the prescription balance, graduals, mortars and pestles, filtration, emulsification, tablet triturates, ointments and creams, suppositories, and prescription packaging.

Prof. Smith

Fall Qtr.

71.202 Pharmacy Orientation

1 Q.H.

Calculations to enable a student to prepare various pharmaceutical formulations and prescriptions. A programmed instruction text is used.

Prof. Smith

Winter Qtr.

71.228 Special Research Project

(Prereq. Consent of Dean) 3 Q.H.

Research on special problems may be undertaken in one or more of the following areas: medicinal chemistry, pharmacognosy, pharmacology, pharmacy, and pharmacy administration.

Staff

Spring Qtr.

71.229, 71.230/Special Research Project

(each) 3 Q.H.

A course of directed study or research in one of the pharmaceutical sciences wherein the student may undertake in-depth investigation of a special interest area.

Prof. Goldstein

71.243 Pharmaceutical Jurisprudence

4 Q.H.

A comprehensive analysis and interpretation of all laws relating to the practice of pharmacy. Federal and state food and drug laws, narcotic laws, Medicare and Medicaid regulations, and state pharmacy laws are discussed.

Prof. Goldstein

Fall Qtr.

71.245 Pharmacy Administration I

4 Q.H.

Socioeconomic aspects of pharmacy: the government's relationship to the pharmaceutical industry, trends in contemporary practice, third-party payment plans, macroeconomic impact on the industry, and the interaction of current concepts in pharmacy.

Prof. Goldstein

Winter Qtr.

71.251 Clinical Pharmacy

(Prereq. 65.218, 72.244) 3 Q.H.

Initial course in clinical pharmacy wherein the student learns to gather and evaluate medication data of patients, make interpretations of clinical laboratory data, and study potential drug interactions of clinical significance.

Staff

Winter Qtr.

71.253 Clinical Pharmacy

(Prereq. 71.251 or equiv.) 7 Q.H.*

Learning to observe patient response to medication and to evaluate and advise on all factors which may modify efficacy, safety, and economy of therapy. Lectures are devoted to basic facts needed to make evaluations and reports. Laboratory consists of two mornings of medical work rounds in the hospital, as well as case discussion orientation in various medical specialties.

Prof. Inashima

Spring Qtr.

71.261 Pharmacy I

(Prereq. 12.145, 11.172) 4 Q.H.*

The study of physicochemical theories and principles, and their application to pharmaceutical systems: intermolecular forces of the various states of matter, solubility phenomena, equilibria, complexation, micrometites, micro- and macromolecular systems, rheology, stability, and chemical kinetics.

Prof. Smith

Fall Qtr.

71.262 Pharmacy II

(Prereq. 71.261) 4 Q.H.*

Application of fundamental principles and methods to the formulation of official and nonofficial preparations and dosage forms.

Prof. Smith

Winter Qtr.

71.263 Pharmacy III

(Prereq. 71.262) 4 Q.H.*

A continuation of 71.262, with further reference to official and nonofficial preparations and more advanced dosage forms.

Fall and Winter Qtrs.

71.264 Pharmacy IV

(Prereq. 71.263) 4 Q.H.

Physicochemical considerations relating to drug effectiveness and dosage from design.

Spring Qtr.

71.270 Principles of Management

3 Q.H.

The fundamentals of business organization, with emphasis on the qualitative and legal aspects of management. An analysis of the marketing structure of the drug trade, forces of organizations, personnel management, and decision-making theory using non-qualitative data.

Prof. Goldstein

71.271 Financial Management

3 Q.H.

The quantitative aspects of management relating to the operation of hospital and retail pharmacies. Emphasis placed on basic accounting procedure, statement analysis, budgets, cash flow, and taxation.

Prof. Goldstein

*Including lab.

- 71.272 Community Pharmacy Management** 3 Q.H.
The management requirements for establishing a community pharmacy. A comparative analysis of the prevailing types of operations, location, leases and business organization, staffing, plant layout and design, and financial factors.
Prof. Goldstein
- 71.275 Seminar in Community Pharmacy Management** 3 Q.H.
A discussion course on all phases of community pharmacy operations, with extensive utilization of the case method of instruction.
Prof. Goldstein
- 71.278 Hospital Pharmacy I** 3 Q.H.
The relationship of the pharmacy to the total hospital structure. Design of the physical plant, staffing personnel management, and the law of institutional practice.
Prof. Goldstein
- 71.279 Hospital Pharmacy II** 3 Q.H.
An analysis of various concepts in drug distribution, with extensive utilization of the case method of instruction.
Mr. Brass
- 71.280 Seminar in Hospital Pharmacy** 3 Q.H.
A discussion course on special topics of current interest relating to hospital pharmacy practice.
Mr. Brass
- 71.282 Parenterals** 3 Q.H.*
A study of parenterals, injectibles, and intravenous additives, with their formulations, properties, methods of preparation, and administration.
Prof. Krause
- 71.283 Professional Practice I** (Prereq. 71.264) 4 Q.H.
Correlates previous pharmacy courses. Emphasis is placed on chemical incompatibilities.
Prof. Palumbo Fall Qtr.
- 71.284 Professional Practice I Laboratory** (Prereq. 71.264) 1 Q.H.
The compounding and dispensing of solid and liquid medication. Emphasis is placed on the correlation of Professional Practice I Lecture material. Prescription practice also involves proprietary medications.
Prof. Palumbo Fall Qtr.
- 71.285 Professional Practice II** (Prereq. 71.283) 3 Q.H.
A continuation of Professional Practice I, including lecture demonstration designed to provide the student with practical knowledge of various surgical devices, appliances, and hospital and sickroom supplies used in modern patient care.
Prof. Palumbo Winter Qtr.
- 71.286 Professional Practice II Laboratory** (Prereq. 71.283) 1 Q.H.
Prescription practice is continued with emphasis on specialties and possible drug interactions.
Prof. Palumbo Winter and Spring Qtrs.
- 71.287 Professional Practice III** (Prereq. 71.285) 4 Q.H.
The current practice of pharmacy. The practical aspects of pharmacy, including the various laws and problems of non-prescription pharmaceuticals applied to case situations in dispensing.
Winter Qtr.
- 72.230 Drug Analysis** (Prereq. 12.145) 5 Q.H.*
A survey of the quantitative analytical techniques applicable to the evaluation and assay of natural and synthetic drugs and their formulations. Emphasis on chromatographic,

*Including lab.

spectroscopic, and other instrumental methods, with selected laboratory experiments in the use of these as defined in official compendia.

Profs. Raffauf and Warner

Spring and Summer Qtrs.

72.241 Introduction to Therapeutics

(Prereq. 18.182, 12.145) 4 Q.H.

Principles of pharmacognosy, pharmacology, and medicinal chemistry applied to the discovery of drugs of therapeutic utility to man. A detailed discussion of drugs affecting the central nervous system.

Prof. Raffauf and Staff

Winter Qtr.

72.242 Chemical Pharmacology I

(Prereq. 72.241) 5 Q.H.

A continuation of 72.241. An interdisciplinary approach to the fundamental chemical and pharmacological principles of drug action. A discussion of the structure-activity relationship, adsorption characteristics, metabolic fate, pharmacodynamics, and therapeutic application principally of those drugs acting at sympathetic and neuroeffector junctional sites.

Prof. Neumeyer and Staff

Spring and Summer Qtrs.

72.243 Chemical Pharmacology II

(Prereq. 72.242) 6 Q.H.*

A continuation of 72.242, with special emphasis on drugs affecting the hematopoietic systems, the kidneys, and the endocrine respiratory systems.

Prof. Neumeyer and Staff

Fall and Winter Qtrs.

72.244 Chemical Pharmacology III

(Prereq. 72.243) 6 Q.H.*

A continuation of 72.243, with special emphasis on anti-infectives and other chemotherapeutic agents, biologicals, and vitamins.

Prof. Raffauf and Staff

Winter Qtr.

72.250 Identification of Abuse Drugs

3 Q.H.*

An introduction to the chemistry, biological action, and methods of detection and assay of commonly abused drugs.

Prof. Raffauf

Fall Qtr.

72.251 Radiopharmaceuticals

(Prereq. 11.175 and 12.145) 3 Q.H.*

The physics, chemistry, and pharmaceutical uses of radiopharmaceuticals. Methods for preparation and handling of these drugs are discussed in a practical way, as well as the rationale for their use in diagnosis and therapy.

Dr. Davis

Winter Qtr.

72.252 Chemical Pharmacognosy

(Prereq. 12.145, 72.230, or consent of instructor) 3 Q.H.*

Modern pharmacognosy and chemotaxonomy with emphasis on methods of plant screening for potentially useful medicinals and pharmaceutical adjuncts; laboratory exercises including the identification and isolation of such principles from known and/or previously uninvestigated plants.

Prof. Raffauf

Winter Qtr.

73.111 Drugs—Their Uses and Actions

4 Q.H.

Attempts to present an integrated background, classification, dose responses, untoward side effects, uses and the commercial preparations of a broad series of drugs. (Not open to Pharmacy Majors.)

Prof. Spector

All Qtrs.

73.114 Basic Pharmacology

(Prereq. 12.107, 86.140, 86.141, 86.136, 86.137, 86.138, 86.139, or consent of instructor) 3 Q.H.

Designed to present the classification, uses, and commercial preparation of a wide variety of drugs of social, therapeutic and diagnostic significance. The course contents will contain introduction to pharmacology, hematologic drugs, vitamins and nutritional agents, neurotropic drugs, analgesics, cardiotropic agents, anesthetic agents, antibiotics, and hormones.

Staff

Fall and Winter Qtrs.

*Including lab.

- 73.115 Pharmacodynamics** (Prereq. 18.148, 18.125, 18.120, 12.106, 12.107) 2 Q.H.
Fundamental principles of drug therapy*, nature of drug and drug effects, mechanism of action, factors influencing drug effect and selected drug classes are discussed.
Prof. Spector Fall and Winter Qtrs.
- 73.203 Anatomy-Physiology** (Prereq. 12.145, 18.132) 5 Q.H.
Structure and function of cells, tissues, organs, and systems discussed in an integrated manner. The cell, the endocrine system, the reproductive system, and the nervous system are covered.
Staff Fall Qtr.
- 73.204 Anatomy-Physiology** (Prereq. 73.203) 5 Q.H.
Structure and function of the various life-supportive systems not covered in the first quarter are included. The study of the endocrine system and the reproductive system concludes the course. Laboratory is devoted to basic principles involved in understanding life systems and cell function.
Staff Winter Qtr.
- 73.210 Drug Interactions** (Prereq. 72.244) 3 Q.H.
A systematic presentation of pharmacologic agents based on drug group classification with special emphasis on clinically significant drug interactions.
Prof. Kosersky Spring Qtr.
- 73.223 Clinical Biochemistry** (Prereq. 90.151) 4 Q.H.*
Electrolytes, enzymes, and hormones of clinical and pathologic interest, with experiments to interpret disordered biochemistry.
Profs. Spector and Giese Spring and Summer Qtrs.
- 73.245 Introduction to Pathology** (Prereq. 72.204, 73.223) 4 Q.H.
Basic concepts of pathology for the Pharmacy student, with emphasis on disease processes and alterations of normal biochemical mechanisms.
Staff Fall Qtr.
- 73.247 Toxicology** (Prereq. 72.244) 4 Q.H.
Principles of toxicology, including FDA requirements relating to new drugs, environmental and other factors affecting the toxicity of therapeutic agents, mechanisms of toxicity, and clinical applications.
Prof. Reinhard Spring Qtr.
- 73.248 Neuropharmacology** (Prereq. 72.244) 3 Q.H.
Neurohumoral control of normal body function and the effects exerted on these systems by neurotropic agents.
Prof. Kosersky Fall Qtr.

Nursing

- 80.101 Fundamentals of Nursing** 6 Q.H.*
Basic to all other courses in nursing. Focus is on the patient as an individual. Underlying this is the concept of homeostasis and the role of the nurse in meeting basic needs. Nursing action is based upon the principles drawn from the behavioral social and biological sciences. Assignments in patient care are designed to provide the student with opportunities to interpret these principles in the promotion of health and the prevention of illness.
Prof. Cappazzoli and Staff Fall Qtr.
- 80.102 Fundamentals of Nursing** (Prereq. 80.101) 6 Q.H.*
The major focus is the identification of common deviations from homeostasis and the supportive nursing measures involved in the restoration of the patient to normal homeostasis.
Prof. Cappazzoli and Staff Winter Qtr.

*Including lab.

80.103 Fundamentals of Nursing

(Prereq. 80.102) 6 Q.H.*

The major focus is on the identification of specific long-term deviations from homeostasis and the nursing actions involved in the restoration of the patient to optimal function and adaptation.

Prof. Cappazzoli and Staff

Spring Qtr.

80.108 Introduction to Technical Nursing

5 Q.H.*

Focus on the role of the technical nurse as a member of the nursing team. Major emphasis placed upon the ability to provide direct nursing care through the use of the problem-solving process in developing and implementing an effective care plan, based upon principles from the biophysical, behavioral, and social sciences with broad application to nursing problems.

Prof. Kane and Staff

Fall Qtr.

80.109 Technical Nursing

(Prereq. 80.108) 2 Q.H.

Emphasis on the student's understanding of selected medical and surgical conditions and developing the ability to relate principles from biophysical and psychosocial sciences to concepts which give meaning to the nursing care of patients.

Prof. Kane and Staff

Winter Qtr.

80.110 Nursing Seminar

(Prereq. 80.108-80.109) 3 Q.H.

A scientific approach to the analysis of health problems and related medical and nursing therapy. Students present the results of independent research in class.

Prof. Kane and Staff

Spring Qtr.

80.111 Trends in Nursing

1 Q.H.

Acquaints the student with the evolution of nursing and its role in society today. Emphasis placed on the latter in discussions of preparation for nursing responsibilities inherent in the nursing role, and events that influence nursing practice as it is today and projected for the future.

Prof. Kane

Spring Qtr.

80.201 Nursing

3 Q.H.*

Introduces the student to modern concepts of health, communication and interviewing techniques, group processes, and problem-solving processes.

Prof. Breton and Staff

Fall Qtr.

80.202 Nursing

3 Q.H.*

Introduces the student to the systems of delivery of health care, role of professional nursing, regional and world health problems. The student serves as group discussion leader at least once during the quarter.

Prof. Breton and Staff

Winter Qtr.

80.203 Nursing

3 Q.H.*

The science of nutrition assists the student in recognizing factors influencing the formation of food habits in self and others; identifying functions of major nutrients, food sources of those nutrients and normal nutrient needs according to age groups; the exploration of health food fads and vegetarian diets and; recognizing the need for objectivity in working with individuals in meeting their needs as well as the importance of nutrition and its relationship to health.

Prof. Breton and Staff

Spring Qtr.

80.204 Nursing—Universal Needs

(Prereq. 80.201, 80.202, 80.203) 5 Q.H.*

Basic nursing theory and application in caring for people in hospital settings. Selected universal needs of man serve as the basis for the course, and the focus is on the nursing process as it relates to meeting these needs.

Prof. Carr and Staff

Fall and Winter Qtrs.

80.205 Nursing—Common Problems I

(Prereq. 80.204) 5 Q.H.*

Exploring problems common to individuals who are unable to meet their own health needs. Clinical practice introduces skills and activities to meet the needs of patients with these common problems in general hospital settings.

Prof. Carr and Staff

Spring and Summer Qtrs.

80.206 Nursing—Common Problems II

(Prereq. 80.205) 8 Q.H.*

Physiological and psychological disturbances in illness. Emphasis on the analysis of patient problems and the nurse's role in the control of infection; pharmacology and drug therapy, responses of body to stress, maintenance of nutrition, and patient teaching in long-term illness. Clinical laboratory experience and a weekly discussion-seminar group.

Prof. Goodfellow and Staff

Fall and Winter Qtrs.

81.101 Medical-Surgical Nursing

(Prereq. 80.103) 11 Q.H.*

Utilizing the concept that all illnesses produce alterations in body function, the student is introduced to selected conditions requiring medical and/or surgical intervention. Major emphasis in classroom and clinical instruction is upon the nurse's role in meeting patients' physical and psychosocial needs, further developing nursing techniques, and learning specific skills needed to care for assigned patients.

Prof. DeScenza and Staff

All Qtrs.

81.102 Medical-Surgical Nursing

(Prereq. 81.101) 7 Q.H.*

Designed to broaden the student's understanding of adults with more serious forms of physical illness. The content has been developed to present the nurse's responsibilities in caring for patients with alterations in physiologic functions and body image. Classroom and clinical experiences focus on principles and nursing skills that are involved in providing complex care for selected patients.

Prof. Carroll and Staff

All Qtrs.

81.201 Medical-Surgical Nursing

(Prereq. 80.206) 9 Q.H.*

Focuses on selected physiologic problems encountered in the care of adult patients. Guided clinical experiences are planned, with special emphasis on the effects of illness on the individual's pattern of living, continuity of care, and health teaching. Classroom and clinical experiences focus on the knowledge and skills necessary to plan and implement comprehensive health care.

Prof. Johns and Staff

All Qtrs.

82.101 Maternal and Child Health

(Prereq. 19.141, 19.142, 80.103) 12 Q.H.*

Focuses on the family and the individual and their developmental task, with emphasis on positive health practices within the family unit. The nursing approach centers upon the health needs of mothers and children of all ages. The needs of the hospitalized child are identified by studying the effect of illness upon his normal growth and development. The common illnesses of childhood are discussed.

Prof. Otto and Staff

All Qtrs.

82.201 Maternal and Child Nursing

(Prereq. 80.206, 19.141) 9 Q.H.*

Focuses on the nursing needs of mothers and children. Experiences are provided in selected maternity and pediatric settings. Emphasis is given to the role of the nurse as a health teacher. Exploration is made of the present-day problems relating to maternal and child welfare and their implications of nursing.

Prof. Lynch and Staff

All Qtrs.

83.101 Psychiatric Nursing

(Prereq. 81.101, 82.101) 6 Q.H.*

Assists the student to acquire additional knowledge of human behavior; to provide the opportunity to achieve understanding of selected human motivations and defenses; and to learn additional interpersonal skills which may be used in the nursing care of patients. The opportunity to apply this knowledge, to observe and analyze behavior, and to practice skills is offered in supervised laboratory sessions.

Prof. Gonyow and Staff

Fall, Winter, and Spring Qtrs.

83.201 Psychiatric-Mental Health Nursing

(Prereq. 80.206) 9 Q.H.*

Designed to increase and develop knowledge of mental illness, understanding of the dynamics of human behavior, and the interrelationship of theory and practice as it applies to clinical and community aspects of mental health and psychiatric nursing.

Prof. Lee and Staff

All Qtrs.

*Including lab.

84.201 Public Health Nursing

(Prereq. 81.201, 82.201, 83.201) 9 Q.H.*

Increases understanding of the variety of ways in which communities organize to meet the health and welfare needs of their members. Principles of public health and public health nursing are examined indepth. Attention is given to current health and welfare legislation, environmental factors affecting health, and the role of the nurse in prevention of disease and maintenance of health. Laboratory experiences provide opportunities to work with individuals, families, and community agencies.

Prof. Tingle and Staff

Fall and Winter Qtrs.

85.201 Contemporary Nursing

(Prereq. 84.201) 9 Q.H.*

The final nursing course before graduation. Includes lectures, seminars, progress reports, and eight weeks of student-selected placement experience. The core content includes legal aspects, roles, leadership, change, and research methods. Students demonstrate self-direction by defining their objectives for placement experience, pursuing an area of nursing in which they are particularly interested, utilizing basic principles of research, and evaluating their own performance.

Staff

Spring Qtr.

Allied Health Professions

General Courses

86.102 Hospital Law

2 Q.H.

An analysis of the legal principles relating to medical and paramedical practice within a hospital environment. The common law and statutory rights of the hospital, practitioner, and patient are discussed.

Spring Qtr.

86.107 Medical Terminology

4 Q.H.

A study of the language of medicine, including prefixes, suffixes, roots, abbreviations, disease and operative and drug terms. Also included are terms related to all area specialties. The terms are studied as they relate to a specific system of the body.

Prof. Zamczyk

Fall Qtr.

86.112 Foundations of Medical Science I

3 Q.H.

Major disease problems in our society and modes of treatment. Discussion of organized care, diagnosis, and treatment. Consideration of reproduction, birth, and pediatrics.

Fall and Winter Qtrs.

86.113 Foundations of Medical Science II

(Prereq. 86.112) 3 Q.H.

A continuation of 86.112 covering heart, cancer, stroke, blood and lymphatic diseases, accidents, and musculoskeletal, respiratory, and gastrointestinal diseases.

Spring and Summer Qtrs.

86.174 Health, Disease, and Disability I

3 Q.H.

Major disease or disability states and their impact on human physiology and psychology. Social and individual response to these states. Lectures, demonstrations, field visits. Part I emphasizes medical areas.

Winter Qtr.

86.175 Health, Disease, and Disability II

(Prereq. 86.174) 3 Q.H.

A continuation of 86.174. Part II emphasizes surgical areas.

Spring Qtr.

87.131 Dynamics of Health Care I

1 Q.H.

Orientation of the Allied Health Profession student to the history and organization of health care in the United States, with an introduction to the roles of the health-care team members.

Allied Health Faculty

Fall Qtr.

87.132 Dynamics of Health Care II

1 Q.H.

Orientation of the Allied Health Profession student to interdisciplinary health care organization, administration, and procedures.

Allied Health Faculty

Winter Qtr.

87.133 Dynamics of Health Care III

1 Q.H.

Orientation of the Allied Health Profession student to current social situations and problems in the delivery of medical care services.

Allied Health Faculty

Spring Qtr.

MEDICAL LABORATORY SCIENCE

The Medical Laboratory Science professional courses are taught by University faculty, together with supportive clinical faculty.

87.100 Laboratory Medicine—Orientation

1 Q.H.

The history and development of the medical laboratory technologies and pathology.

Prof. Karlsson

Winter Qtr.

87.101 Basic Medical Laboratory Science

(Prereq. 18.132, 12.104, or 12.107) 4 Q.H.*

Introductory course in the basic medical laboratory sciences: methods, principles, theories.

Prof. Hallsworth

Fall and Spring Qtrs.

87.102 Basic Medical Laboratory Hematology

(Prereq. 81.101) 2 Q.H.*

Principles and procedures of basic medical laboratory hematology, including basic coagulation.

Staff

Fall and Winter Qtrs.

87.103 Basic Medical Laboratory Immunohematology

(Prereq. 87.101) 2 Q.H.*

Basic principles in immunohematology and related techniques, with particular emphasis on those procedures used in blood banking.

Prof. Barr

Fall and Winter Qtrs.

87.104 Basic Medical Laboratory Science Clinical Microbiology

4 Q.H.*

Basic principles and techniques of organism isolation, cultivation, and identification from clinical specimens. Elementary serologic procedures will be discussed.

Prof. Barr

Fall and Winter Qtrs.

87.105 Basic Medical Laboratory Chemistry and Instrumentation

(Prereq. 87.101) 4 Q.H.*

Principles, procedures, and techniques of basic clinical chemistry and instrumentation.

Prof. Hallsworth

Spring and Summer Qtrs.

87.111 Medical Microbiology Applied Study (At Hospital) (Prereq. 18.220, 87.101) 4 Q.H.

Clinical practicum in applied microbiology at an affiliated accredited hospital school of medical technology.

Spring Qtr.

87.112 Hematology and Immunohematology Applied Study (At Hospital)

(Prereq. 87.102, 87.103) 4 Q.H.*

Clinical practicum in applied hematology, coagulation, and blood banking at an affiliated accredited hospital school of medical technology.

Fall Qtr.

87.115 Medical Laboratory Chemistry Applied Study (At Hospital)

(Prereq. 12.145, 12.171, 87.105) 4 Q.H.*

Clinical practice in applied clinical chemistry at an affiliated accredited hospital school of medical technology.

Winter Qtr.

87.120 Communications in the Health Sciences

3 Q.H.

Effective communication in the medical scientific community.

Prof. Barr

Fall and Winter Qtrs.

- 87.121 Quality Control** (Prereq. 12.171, 10.105, 87.101, 87.105) 2 Q.H.
Basic statistical methods used in medical laboratory quality control.
Prof. Hallsworth Winter Qtr.
- 87.190 Undergraduate Research** (Prereq. 87.102, 87.103, 87.105) 2 Q.H.
Special problems in laboratory medicine involving individual research under the direction of a faculty member.
Staff Spring Qtr.
- 87.201 Pathogenic Microbiology** (Prereq. 18.220 and 87.101) 4 Q.H.*
Methods of identification and differentiation of normal and pathogenic body flora. Basics of virology; fundamentals of mycology and mycological infections.
Prof. Barr Spring Qtr.
- 87.202 Hematology and Immunochemistry** (Prereq. 18.132, 87.102, 87.103) 4 Q.H.*
Review of hemopoiesis morphology and physiology of blood cells and bone marrow. Basic lectures with complementary clinical pathology conferences; discussions on current literature and applied laboratory experiences.
Staff Fall Qtr.
- 87.203 Medical Immunology and Serology** (Prereq. 87.201, 87.103) 2 Q.H.*
Medically applied immunological and serological concepts and procedures.
Dr. Gozzo and Prof. Barr Fall Qtr.
- 87.204 Medical Parasitology** (Prereq. 18.220) 2 Q.H.*
Laboratory identification of human parasites and a study of their life cycles.
Staff Winter Qtr.
- 87.205 Clinical Chemistry** (Prereq. 12.171, 12.145, 87.101, 87.105) 4 Q.H.*
Principles and methodologies of current clinical chemistry procedures used in the medical laboratory for the assessment of human physiological conditions.
Prof. Hallsworth Winter Qtr.
- 87.221 Medical Laboratory Management** 2 Q.H.
Principles of laboratory supervision, communication, and personnel relations. Professional ethics, relationships, and legal responsibilities.
Staff Spring Qtr.
- 87.226 Medical Laboratory Science Education** 2 Q.H.
Use, evaluation, and development of educational media with particular emphasis on correlation of didactic and clinical instruction.
Prof. Barr Fall Qtr.

MEDICAL RECORDS ADMINISTRATION

- 86.151 Medical Record Science I** (Prereq. Two years of liberal arts) 4 Q.H.*
Introduction to medical records; history of the medical record and medical record forms. A study of the professional medical record administrator and his relationship to the health facility. Medical staff and committees in hospital. Quantitative analysis of medical records.
Prof. Zamczyk Spring and Summer Qtrs. 1975
- 86.152 Medical Record Science II** (Prereq. 86.151) 4 Q.H.*
The numbering, filing, securing, and preserving of medical records. Principles of law as related to patient care and medical records. Study and practice of medical transcription. The rules of privileged communications and the release of information to agencies are stressed.
Fall and Winter Qtrs. 1975-76
- 86.153 Medical Record Science III** (Prereq. 86.152) 4 Q.H.*
Basic principles of compiling statistics for hospital and other health institutions. Includes the preparation of the daily census, discharge analysis, monthly, annual, and special reports. Birth and death certificates are included. Principles of Standardized Nomenclature of

*Including lab.

Diseases and Operations and International Classification of Disease, adapted - 8. Study of other indexes used in medical records departments.

Spring and Summer Qtrs. 1976

86.154 Advanced Medical Record Science IV

(Prereq. 86.153) 4 Q.H.*

Advanced aspects of medical record science. Includes developing of forms and forms control, planning and managing, new record systems; advanced aspects dealing with statistics and consulting in extended-care facilities and nursing homes.

Fall and Winter Qtrs. 1976-77

86.155 Organization and Management of Medical Record Department I

3 Q.H.

The hospital: patterns of organization, lines of responsibility and authority, medical staff and administrative organization, departmental functions and organization. Fundamental principles and successful practices in accomplishing office work. Office management problems and their solution; conceptual framework for the operation of essential management function, facilities, solutions, and contributions of the office.

Fall and Winter Qtrs. 1976-77

86.156 Organization and Management of Medical Record Department II

(Prereq. 86.155) 3 Q.H.

Development of an efficient medical record department in any medical care facility. Application of the principles of organization and management in the development and administration of a system of handling medical information.

Spring and Summer Qtrs. 1977

86.157 Seminar in Medical Records

(Prereq. 86.154 or concurrently) 2 Q.H.

Case study and discussion for the purpose of integrating the discrete skills and knowledge of the professional curriculum into a meaningful whole by student analysis of real and hypothetical problems.

Fall and Winter Qtrs. 1976-77

86.252 Applied Medical Record Science—Directed Study I

(Prereq. 86.151, 86.107) 3 Q.H.*

Clinical practicum in medical record science and management techniques at one or more of several affiliated hospitals.

Prof. Zamczyk

Fall and Winter Qtrs.

86.253 Applied Medical Record Science—Directed Study II

(Prereq. 86.252) 3 Q.H.*

Clinical practicum in medical record science and management techniques at one or more of several affiliated hospitals.

Spring and Summer Qtrs.

86.254 Applied Medical Record Science—Directed Study III

(Prereq. 86.253) 2 Q.H.*

Clinical practicum in medical record science and management techniques at one or more of several affiliated hospitals.

Fall and Winter Qtrs.

RESPIRATORY THERAPY

86.181 Introduction to Respiratory Therapy I

2 Q.H.

The development and understanding of the respiratory therapist's role as a member of the health care profession. A concise survey of the normal structures and functions of the human body with particular emphasis on the organs of respiration and circulation and the principle of oxygen and tissue metabolism.

Mr. McNeil

Fall Qtr.

86.182 Introduction to Respiratory Therapy II

(Prereq. 86.181) 3 Q.H.

An expansion of the information from 86.181 into the area of cardiopulmonary pathology, and the applications of physical principles to respiratory care.

Mr. McNeil

Winter Qtr.

*Including lab.

86.183 Mechanics in Respiratory Therapy

(Prereq. 86.182) 4 Q.H.*

The application of basic microbiologic principles to the sterilization of respiratory therapy equipment. Theory and classification of flowmeters, regulators, nebulizers, humidifiers, and ventilators. The laboratory is devoted to the application and troubleshooting of the apparatus.
Mr. McNeil and Mr. Donahue Spring Qtr.

86.184 Procedures of Respiratory Therapy I

(Prereq. 86.183) 4 Q.H.*

This course is designed as the didactic portion of beginning clinical experience to augment the student's understanding of physiologic respiratory care. Physical examination of the chest, laboratory diagnosis, and chest X-ray are presented. The pathophysiologic basis of the therapy of restrictive and obstructive diseases, acute respiratory failure, and chronic respiratory failure are discussed in detail.

Prof. Cassara

Fall and Winter Qtrs.

86.185 Procedures of Respiratory Therapy II

(Prereq. 86.184, 86.284) 4 Q.H.*

The major chest diseases of neonates, children, and adults from the approach of diagnosis, etiology, treatment, and prognosis.

Prof. Cassara

Spring and Summer Qtrs.

86.186 Respiratory Diagnostics

(Prereq. 86.185, 86.285) 4 Q.H.*

The third didactic companion to the third clinical experience quarter. It teaches the theory and techniques of blood gas analysis and pulmonary function testing.

Staff

Fall and Winter Qtrs.

86.187 Advanced Respiratory Care

(Prereq. 86.186, 86.286) 4 Q.H.*

Principles of departmental organization and concepts of organizational professional responsibilities. Each student presents an independently researched clinical paper based on the current literature and visits to representative patients in the clinical affiliates.

Prof. Cassara

Spring Qtr. 1975

86.284 Directed Applied Study—Respiratory Therapy

(Prereq. 86.184, 86.185 concurrently, 86.284) 4 Q.H.*

Clinical experience matched to concurrently taught didactic subject matter. Skills acquired include: physical examination of the chest, airway management techniques, basic oxygen administration, and intermittent positive pressure breathing exercises.

Clinical Faculty

Fall and Winter Qtrs. 1974

86.285 Directed Applied Study—Respiratory Therapy

(Prereq. 86.184, 86.185 concurrently, 86.284) 4 Q.H.*

Clinical material matched to concurrently taught didactic subject matter. Skills acquired include: tracheostomy and endotracheal tube care, management of continuous artificial ventilation with volume and pressure pre-set devices, and chest physical therapy techniques.

Clinical Faculty

Spring and Summer Qtrs. 1974

86.286 Directed Applied Study—Respiratory Therapy

(Prereq. 86.186 concurrently) 4 Q.H.*

Clinical experience matched to concurrently taught didactic subject matter. Skills acquired include: spirometric measurement of lung volumes and flow rates, dilution techniques for measurement of residual volume, measurement of A/a gradient and vd/vt , and blood measurement of PO_2 , PCO_2 , and pH.

Clinical Faculty

Fall and Winter Qtrs. 1975

Cooperative Education

90.251 Placement Techniques

1 Q.H.

Career selection and development are discussed concurrently with resume preparation, interviewing techniques, and effective written communication to facilitate the planning and implementation of a professional career program.

Fall and Winter Qtrs.

*Including lab.

90.253 Professional Development for Teachers

1 Q.H.

Teacher certification, professional ethics, and professional development are examined, along with effective methods of achieving career goals through resume preparation, written communication, and the interviewing process.

Fall and Winter Qtrs.

90.254 Professional Development for Nurses

1 Q.H.

Personal, legal, and professional responsibilities of nursing are discussed concurrently with resume preparation, personal presentation, and effective written communication.

Fall and Winter Qtrs.

90.255 Professional Development in Criminal Justice

1 Q.H.

Career options in criminal justice are reviewed, along with the techniques of resume preparation, interviewing, and effective written communication

Fall and Winter Qtrs.

90.258 Professional Development for Engineers

1 Q.H.

Career development in engineering is examined with a view to current practice and developing trends, along with discussion of resume preparation, interviewing techniques, and effective written communication.

Fall and Winter Qtrs.

Military Science

*Military Science I***91.101 U.S. Defense Establishment**

1 Q.H.

Emphasis is given to the history, organization, and mission of the Department of Defense. Further, the mission and organization of the U.S. Army is studied, with emphasis given to the integration of small units into larger units and the general design of military organization.

Fall Qtr.

91.102 Map and Aerial Photo Reading

(Prereq. 91.101) 1 Q.H.

Use of maps and aerial photographs to develop an understanding and an appreciation of these instruments of command and their application to the military service.

Winter Qtr.

91.103 Leadership Laboratory

(Prereq. 91.102) 1 Q.H.

Progressive training in leadership, drill, and command. Exercise in command is stressed wherein students perform duties and functions as officers incident to conduct of training.

Spring Qtr.

*Military Science II***91.104 American Military History and Tactics**

(Prereq. 91.103) 2 Q.H.

Selected battles and campaigns, coupled with major periods of international crises, are studied with a view towards giving the student an appreciation of the development of the U.S. Army. An introduction to the fundamentals and principles of small unit tactics.

Fall and Winter Qtrs.

91.105 Officer Development Leadership Laboratory

(Prereq. 91.104) 1.5 Q.H.

The functions, duties, and responsibilities of junior military leaders and the development of leadership potential through practical exercises; discussion of the ROTC Advanced Course. Leadership laboratory as described in 91.103.

Spring and Summer Qtrs.

*Military Science III***91.106 Leadership and Management**

(Prereq. 91.105) 2 Q.H.

Review of the basic problems in leading small units, with emphasis on the role of a platoon

leader in setting goals, standards, and motivating performance. Familiarization with communications equipment organic to small units within the Army. Methods of instruction for small unit training classes.

Fall and Winter Qtrs.

91.107 Fundamentals and Dynamics of the Military Team I—Leadership Laboratory

(Prereq. 91.106) 2 Q.H.

Organization of small units within the army and the support which they receive. Familiarization with the principles and fundamentals of small unit tactics. Leadership laboratory as described in 91.103.

Spring and Summer Qtrs.

91.108 Fundamentals and Dynamics of the Military Team II (Prereq. 91.107) 2.5 Q.H.

Composition and development of military intelligence; estimate of the situation, troop leading procedures; operation orders; combined arms tactics at the platoon and company levels in offensive, defensive and special operations. A discussion of the role of the branches of the Army within the overall mission of the Army.

Fall and Winter Qtrs.

Military Science IV

91.109 Leadership and Management—Leadership Laboratory (Prereq. 91.108) 2.5 Q.H.

Command and staff responsibilities and relationships; a study of the combat, combat support and combat service support units within the division and their relationship to each other as part of the military team; tactical air; airmobile operations. Leadership laboratory.

Spring and Summer Qtrs.

91.110 Leadership and Management II—Internal Defense Development

(Prereq. 91.109) 2 Q.H.

The organizational, environmental, personnel, and legal problems encountered by the manager of the modern military team. Included is a discussion of the strategic environmental background in which the military team is employed.

Fall and Winter Qtrs.

91.111 Pre-Camp Orientation—Leadership Laboratory

(Prereq. 91.110) 2 Q.H.

An orientation designed to prepare the cadet for summer camp. Physical training is emphasized to ensure that the cadet is physically prepared. Leadership requirements for the future officer are discussed.

Spring Qtr.

Criminal Justice

92.104 Administration of Criminal Justice

4 Q.H.

Surveys the entire contemporary criminal justice system from the initial contact with the offender through prosecution, disposition, incarceration, and release to the community. Emphasis is placed on major systems of social control: police, corrections, juvenile justice, mental health systems, and their policies and practices relative to the offender. A balance is maintained in providing legal, empirical, and sociological materials.

Prof. Senna

Spring and Summer Qtrs.

92.110 Police-Community Relations

(Prereq. 92.131, 92.115, 92.132/Seniors) 4 Q.H.

Police-public contact; uses of the communications media in projecting the police image; responsibilities of police in dealing effectively with minority groups, civil rights, civil disorder, and public protection. An exploration of the role and function of the role in intergroup relations.

Prof. Sheehan

Fall and Winter Qtrs.

92.113 Law Enforcement Procedures and Social Structure

(Prereq. 21.100) 4 Q.H.

Law enforcement systems in relation to class structure, political, economic, and social power; police and community subcultural developments and problems of professionalization.

Prof. Natoli

Fall and Winter Qtrs.

92.115 Police Operations

(Prereq. 92.131) 4 Q.H.

A general survey of police operational procedures, including patrol, traffic, interrogations, and report writing. Roleplaying is used extensively to demonstrate interviewing methods.

Prof. Sheehan

Spring and Summer Qtrs.

92.130 Criminalistics I

4 Q.H.

Criminal investigation dealing with areas of investigation, case preparation and applied physiology.

Prof. Cunliffe

Fall, Winter, and Spring Qtrs.

92.131 Law Enforcement Administration and Management

4 Q.H.

The principles of police organization, administration, and management, including staff and line functions, chain of command, span of control, selection of personnel, and promotional systems. Consideration is also given to special problems such as strikes, natural and atomic disasters, narcotic traffic, and vice control.

Prof. Sheehan

Fall and Winter Qtrs.

92.132 Police Supervision

4 Q.H.

The police supervisor's role in discipline, intradepartmental relations, problem-handling and personnel policies. Problems relating to supervisory relationships, wages, grievances, morale, and safety.

Prof. Natoli

Fall and Winter Qtrs.

92.134 Constitutional Problems I: The Police and the Criminal Suspect

4 Q.H.

Utilizing Supreme Court decisions and other sources, this course encompasses a study of the constitutional rights of speech, press, religion, association, equal protection of the laws, and their relevance to a democratic society.

Prof. Kassler

Spring and Summer Qtrs.

92.137 Criminology

4 Q.H.

Patterns and evolution of criminal behavior, the social forces involved, and development of the individual criminal; administration of criminal justice; law, courts, police, prisons.

Prof. Schafer

Fall and Winter Qtrs.

92.138 Juvenile Delinquency and Youth Crime

(Prereq. 92.137 or equiv.) 4 Q.H.

The sociological and psychological approaches and their implications for a typology of delinquency; problems of prevention, treatment, and rehabilitation.

Prof. Schafer

Spring and Summer Qtrs.

92.139 Theories in Penology

(Prereq. 21.100, 92.137) 4 Q.H.

Deals with history, philosophy and development of punishment in the United States as it is manifested in the penal structure.

Prof. Turek

Spring and Summer Qtrs.

92.140 Criminalistics III

(Prereq. 11.113, 114 or 18.114, 115 or 12.139, 12.140 or equiv.) 4 Q.H.

A course in the examination and behavior of fire. Deals with fire-related phenomena such as convection, radiation, contact, and ignition. This embodies consideration of arson, explosions, asphyxiation, and combustibility. The engineering is dealt with in terms of fireproofing agents such as plastics, textiles, building materials, and the chemistry of the halogens. Finally, some time is given to areas of fire experimentation and the potential for more sophisticated inquiry.

Prof. Cunliffe

Fall, Winter, and Spring Qtrs.

92.141 Criminal Law: Procedural Due Process

4 Q.H.

Utilizing current Supreme Court decisions and other sources, this course examines the relationship between the Bill of Rights and the states, with primary emphasis on the guarantees of fair trial, counsel, privacy, immunity from self-incrimination, and other constitutional safeguards in state and Federal criminal proceedings.

Prof. Kassler

Fall and Winter Qtrs.

92.142 Constitutional Problems II: The Courts and the Accused

4 Q.H.

Rules of evidence, principles of exclusion, evaluation and examination of evidence and proof,

competency, consideration of witnesses. Fundamentals of courtroom procedure, testifying in court, the principles of prosecuting a case, the introduction of evidence. Roleplaying is used as a learning device in mock trials. Class members are required to attend and report on criminal trials.

Prof. Kassler

Spring and Summer Qtrs.

92.143 Criminalistics II

4 Q.H.*

A survey of the elements of microscopy, spectroscopy, and basic chemistry as they apply to the study of firearms, hair, fibers, blood, paint, tools, glass, documents, laundry marks, poisons, and other materials which comprise physical evidence.

Prof. Cunliffe

Fall, Winter, and Spring Qtrs.

92.146 Legal Aspects of Society

4 Q.H.

Twentieth-century society, with an emphasis upon the legal structure and its impact upon society.

Prof. Kassler

Fall and Winter Qtrs.

92.147 The Juvenile and the Courts

(Prereq. 21.100, 92.137) 4 Q.H.

Course work examines the juvenile court: its philosophy, procedure, and personnel. Focus is on the discretionary processes by which juveniles are labelled delinquent, dependent and neglected. The roles played by police, prosecution, defense, bench, and social service workers are considered. Field visits arranged.

Prof. Siegle

Fall and Winter Qtrs.

92.148 Probation and Parole

(Prereq. 21.100) 4 Q.H.

Examines the nature and problems of correctional field service, both adult and juvenile.

Prof. Deming

Fall and Winter Qtrs.

92.149 Alternatives to the Incarceration of Juvenile Offenders

4 Q.H.

Examines the concept of juvenile justice in terms of the alternatives to and the negative consequences of institutionalization of juvenile offenders. Examines diversion from court, probation, crisis centers, halfway houses and other alternatives. Includes examination of sanctions imposed on youth and the role of the various "arms" of the "justice system."

Prof. Reed

Fall and Winter Qtrs.

92.155 Seminar in Law Enforcement

(Prereq. 92.131, 92.115, 92.132 Juniors/Seniors) 4 Q.H.

An opportunity for free discussion about the numerous problems facing the law enforcement officer. Periodic oral and written reports are required. Guest lecturers are invited to participate in and lead discussion sessions. An effort is made to have each student formulate his own philosophy of law enforcement prior to his graduation.

Prof. Sheehan

All Qtrs.

92.156 Seminar in Law and Criminal Justice

(Prereq. 92.141, 92.134 Juniors/Seniors) 4 Q.H.

Prof. Kassler

Fall, Winter, and Spring Qtrs.

92.157 Research Methods in Criminal Justice

4 Q.H.

Development of research design of the kind most useful to criminal justice problems; understanding of some of the most important issues and problems facing researchers in the field; use of various data collection methods including observation, interviewing, questionnaire construction, and scales for survey analysis; validity and reliability; computer application in criminal justice.

Prof. Siegel

Spring and Summer Qtrs.

92.160 Social Welfare Problems in Criminal Justice

(Prereq. All first-year requirements) 4 Q.H.

A critical examination of culture-of-poverty themes; a brief study of the social welfare system; development of techniques for referral to social agencies; development of self-awareness through thoughtful evaluation of personal bias and experience.

Prof. Ames

Fall and Winter Qtrs.

92.162 Introductory Statistics and Social Research

4 Q.H.

An elementary survey and analysis of the uses of statistics and social research methods, with special reference to utilization of data from the field of criminal justice. The first part of the course covers descriptive statistics and the second examines the basic techniques in social research. Attention is given to methods of collecting, analyzing, and interpreting statistical data, and to the use of statistics in the development of research designs.

Prof. Siegle

Fall and Winter Qtrs.

92.165 Rehabilitation of the Offender

(Prereq. 92.148, 92.167) 4 Q.H.

Basic concepts for influencing and changing human behavior. Special attention is given to an examination of various types of current programs and services developed in the criminal justice system to rehabilitate the offender. Particular emphasis is made of contemporary practices in corrections, such as the community-based work release program, halfway houses, and various forms of individual treatment services.

Prof. Senna

Spring and Summer Qtrs.

92.166 Casework and Counseling in Criminal Justice

(Prereq. 19.105, 19.106, 21.100 or their equiv. and 92.160) 4 Q.H.

Course is intended to acquaint students with the psychodynamics of adolescent behavior; teaches them very rudimentary techniques of casework useful in counseling adolescents.

Prof. Ames

Spring and Summer Qtrs.

92.167 Correctional Institutions

(Prereq. 92.139) 4 Q.H.

An analysis of the organization and administration of correctional institutions.

Prof. Deming

Fall and Winter Qtrs.

92.191, 92.192, 92.193, 92.194 Directed Study

(each) 4 Q.H.

92.207 Suicide

(Prereq. Consent of instructor) 4 Q.H.

The social and psychological implications of suicide. Theoretical readings begin with Durkheim and go through Alvarez. One day each week spent in study and research at "hot lines" and suicide prevention centers in the metropolitan area.

Prof. Ames

Spring and Summer Qtrs.

92.208 Comparative Police Systems

(Prereq. 92.131) 4 Q.H.

A comparative analysis of police departments throughout the world.

Prof. Natoli

Spring and Summer Qtrs.

92.209 Female Offender

(Prereq. 21.100) 4 Q.H.

The course addresses itself to the female at the various stages in the criminal justice system, from commission of a crime to parole. Both the juvenile and adult offender is studied. The thrust of the course is a critical analysis of existing theory and research on the female offender, with emphasis on the socialization, roles, and social participation of women in society at-large. The male offender is also considered at each level in a comparative sense.

Prof. Turek

Fall and Winter Qtrs.

92.210 Topics in History of Criminal Justice

4 Q.H.

An historic survey of the principles of criminal justice in the ancient and medieval periods, with emphasis upon the impact of religion and philosophy.

Dean Rosenblatt

Fall Qtr.

92.211 Topics in History of Criminal Justice

4 Q.H.

A continuation of the historic survey with an examination of the effect of the Renaissance, Reformation and the rise of nation states.

Dean Rosenblatt

Winter Qtr.

92.280 Seminar in Victimology

(Prereq. Juniors and Seniors with consent of instructor) 4 Q.H.

Criminal-victim relationships, with emphasis on victim-precipitated crimes and compensation to the victims. The concept and significance of "victimology;" time, space, sex, age, and occupational factors in criminal-victim relationships; victims of murder, rape, other violent crimes, and property crimes; victim typology; the public or victim; restitution to crime victims. The functional responsibility of the victim.

Prof. Schafer

All Qtrs.

92.287 Community Service Practicum I

(Prereq. 92.160, 92.166 and consent of instructor) 6 Q.H.

Prof. Ames

All Qtrs.

92.288 Community Service Practicum II

(Prereq. 92.287) 6 Q.H.

Prof. Ames

All Qtrs.

Interdisciplinary Courses

93.110 Programming Computers with FORTRAN

(Prereq. One year college math.) 4 Q.H.

Techniques for programming problems on any large computer. Emphasis is on general programming methods using the language of FORTRAN. A large number of example problems are presented in an effort to display the applicability of computers to a wide variety of professional activities. No prior computer experience is required.

Prof. Rule

Fall, Winter, and Spring Qtrs.

93.111 Advanced FORTRAN Programming

(Prereq. 93.110) 4 Q.H.

Higher-level aspects of the FORTRAN language are considered. Topics covered include: the use of software packages, the manipulation of large data arrays, processing of non-numeric information, magnetic tape operations, and data file management. An introduction to systems analysis is presented, with emphasis on Monte Carlo and queuing simulation techniques.

Prof. Finkenaur

Fall, Winter, and Spring Qtrs.

93.113 Computers for the Social Sciences

4 Q.H.

Simple FORTRAN is covered only to the point where students can solve elementary original problems. Emphasis is then given to communicating with a discipline-oriented software package, SPSS (Subroutine Package for Social Scientists), to show how computers solve problems peculiar to the social scientist.

Prof. Rule and Staff

Winter Qtr.

93.120 An Analysis of American Racism

4 Q.H.

A seminar in contemporary aspects of racism in America. The cycle by which racism in our institutions helps form our attitudes, and how our attitudes in turn shape our institutions, is studied and discussed. Emphasis is on the practical, day-to-day aspects of racism, rather than the theoretical and historical.

93.125 COBOL Programming I

4 Q.H.

Fundamentals of computer programming in COBOL. Topics include: elementary computer functioning, program organization, input/output operations, arithmetic and data-handling verbs, and program logic development through the use of flow charts. Storage and manipulation of large data files on magnetic tape are introduced. No prior computer experience is required.

Prof. Finkenaur

Fall and Winter Qtrs.

93.126 COBOL Programming II

(Prereq. 93.125) 4 Q.H.

Higher-level aspects of the COBOL language are considered. Use of decision tables in development of program logic. Improving program efficiency. Error detection and minimization techniques. Bulk data storage in magnetic tape and disc files. Storing, merging, updating, sorting, and purging of data files. Report generation.

Prof. Finkenaur

Spring Qtr.

93.151 General Biochemistry

(Prereq. Two quarters organic chemistry) 4 Q.H.

Introduction to biochemical compound types, occurrence, chemistry, and introduction to metabolism.

93.152 Physical Biochemistry

(Prereq. 93.151) 4 Q.H.

Bioenergetics, enzymes, and enzyme kinetics, with application to central area of metabolism biooxidation and reduction processes.

Chemistry Staff

Spring and Summer Qtrs.

93.153 Metabolic Biochemistry

(Prereq. 93.152) 4 Q.H.

The emphasis is on the regulation of metabolic pathways, protein and nucleic acid structure, function, and synthesis.

Prof. Bialy (Biology)

93.160 American Musical Theatre

4 Q.H.

An interdisciplinary course, taught by the departments of Drama and Music. The development of the American musical, from the *Black Crook* to *Hair* and *Jesus Christ Superstar*, as an entertainment and as a serious art-form, through an examination of script, score, dance, and design. Works by Bernstein, Rodgers and Hammerstein, the Gershwins, Weill, Lerner and Loewe, and Cole Porter, are examined. Guest lecturers, recordings, films, live productions, supplement the course.

Profs. Blackman and Silverman

Fall and Winter Qtrs.

93.201 Introductory Computer Programming

2 Q.H.

An introductory course designed for Liberal Arts majors, showing how computers function and how they are used. No prior experience is needed. Students learn how to use the large University computer and how to program in Fortran for any large computer.

Dr. Eisemann

Fall and Winter Qtrs.

93.202 Intermediate Computer Programming

(Prereq. 93.201) 2 Q.H.

An intermediary level course designed for Liberal Arts majors, applying computer programming techniques to solve typical problems.

Dr. Eisemann

Winter and Spring Qtrs.

93.203 Advanced Computer Applications

(Prereq. 93.202) 2 Q.H.

An advanced level course designed for Liberal Arts majors with programming experience. Application of sophisticated techniques to solve more advanced and difficult problems.

Dr. Eisemann

Spring Qtr.

93.210 Assembly Language Programming

(Prereq. Knowledge of some compiler language) 4 Q.H.

The unique programming concepts encountered in assembly language programming. Course content includes: number system theory, internal machine representation of information, complement arithmetic, basic machine language programming, assembly language instructions; concepts of addressing, subroutine linkage, character manipulation; floating vs. fixed point operations.

Prof. Rule and Staff

Spring Qtr.

Academic Calendar 1974 - 1976

September 1974

2	Monday	LABOR DAY. University closed.
12	Thursday	FALL COMMENCEMENT.
26	Thursday-	First day freshmen may occupy dormitories.
27	Friday	Freshman (Class of 1979) registration at Boston and Burlington Campuses Beginning of orientation period. Orientation also for external transfers.
30	Monday	Beginning of 1974-1975 academic year. Upper-class registration for Divisions B and C. Boston and Burlington freshmen complete their registration No Basic Colleges classes today.

October 1974

14	Monday	COLUMBUS DAY. University closed.
28	Monday	VETERANS' DAY. University closed.

November 1974

28-30	Thursday-Saturday	THANKSGIVING DAY recess.
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December 1974

16-20	Monday-Friday	Final examinations for Basic Colleges.
23-Jan. 3	Monday-Friday	CHRISTMAS vacation.

January 1975

1	Wednesday	NEW YEAR'S DAY. University closed.
6	Monday	Registration for upper-class Division A and C. Registration for freshmen (Quarter Two) at Boston Campus, Burlington Campus, and January freshman section of Class of 1979. Beginning of Winter Quarter. Beginning of Division B work quarter. No Basic Colleges classes today.

February 1975

17	Monday	WASHINGTON'S BIRTHDAY. University closed.
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March 1975

24-28	Monday-Friday	Final examinations for Basic Colleges.
31-Apr. 5	Monday-Saturday	Vacation period for all students in all colleges and schools. (Division A vacation.)

April 1975

7	Monday	Registration for Divisions B and C students and Division A seniors. Registration for freshmen (Quarter Three) at Boston Campus, Burlington Campus, and January freshmen (Quarter Two). Beginning of Spring Quarter. Beginning of Division A work period. No Basic Colleges classes today. PATRIOTS' DAY. University closed.
21	Monday	

May 1975

26	Monday	MEMORIAL DAY. University closed.
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June 1975

16-20	Monday-Friday	Final examinations for Basic Colleges.
22	Sunday	COMMENCEMENT.
23-28	Monday-Saturday	Division B vacation.
30	Monday	Registration for Divisions A and C and January freshmen (Quarter Three). Beginning of Summer Quarter. Beginning of Division B work quarter. No Basic Colleges classes today.

July 1975		
4	Friday	INDEPENDENCE DAY. University closed.
September 1975		
1	Monday	LABOR DAY. University closed.
8-12	Monday-Friday	Final Examinations for Basic Colleges.
15-27	Monday-Saturday	Division A vacation.
18	Thursday	FALL COMMENCEMENT.
24	Wednesday	First day freshmen may occupy dormitories.
25	Thursday	Freshman (Class of 1980) registration at Boston and Burlington Campuses. Beginning of orientation period. Orientation also for external transfers.
29	Monday	Beginning of 1975-1976 academic year. Upper-class registration for Divisions A and C. Boston and Burlington freshmen complete their registration. No Basic Colleges classes today.
October 1975		
13	Monday	COLUMBUS DAY. University closed.
27	Monday	VETERANS' DAY. University closed.
November 1975		
27-29	Thursday-Saturday	THANKSGIVING DAY recess.
December 1975		
15-19	Monday-Friday	Final Examinations for Basic Colleges.
22-Jan. 2	Monday-Friday	CHRISTMAS vacation.
January 1976		
1	Thursday	NEW YEAR'S DAY. University closed.
5	Monday	Registration for upper-class Divisions B and C. Registration for freshmen (Quarter Two) at Boston Campus, Burlington Campus, and January freshman section of Class of 1980. Beginning of Winter Quarter. Beginning of Division A work quarter. No Basic Colleges classes today.
February 1976		
16	Monday	WASHINGTON'S BIRTHDAY. University closed.
March 1976		
22-26	Monday-Friday	Final examination for Basic Colleges.
29-Apr. 2	Monday-Friday	Vacation period for all students in all colleges and schools (Division B vacation.)
April 1976		
5	Monday	Registration for Divisions A and C students and Division B seniors. Registration for freshmen (Quarter Three) at Boston Campus, Burlington Campus, and January Freshmen (Quarter Two). Beginning of Spring Quarter. Beginning of Division B work period. No Basic Colleges classes today.
19	Monday	PATRIOTS' DAY. University closed.
May 1976		
31	Monday	Memorial Day. University closed.
June 1976		
14-18	Monday-Friday	Final examinations for Basic Colleges.
20	Sunday	COMMENCEMENT.
21-26	Monday-Saturday	Division A vacation.

28	Monday	Registration for Divisions B and C and January Freshmen (Quarter Three Beginning of Summer Quarter. Beginning of Division A work quarter. No Basic Colleges classes today.
July 1976		
5	Monday	INDEPENDENCE DAY. University closed.
September 1976		
6	Monday	LABOR DAY. University closed.
7-10	Tuesday- Friday	Final examinations for Basic Colleges.
13-25	Monday-Saturday	Division B vacation.
22	Wednesday	First day freshmen may occupy dormitories.
23	Thursday	Freshman (Class of 1981) registration at Boston and Burlington Campuses. Beginning of orientation period. Orientation also for external transfers.
27	Monday	Beginning of 1976-1977 academic year. Upper-class registration for Divisions B and C. Boston and Burlington freshmen complete their registration. No Basic Colleges classes today.

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